



SUPREME AUDIT INSTITUTION OF INDIA
लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

**Report of the
Comptroller and Auditor General of India
for the year ended 31 March 2023**

**Performance Audit on Power Generation activities
of Tamil Nadu Generation and Distribution
Corporation Limited**



**Government of Tamil Nadu
Report No. 4 of 2025
(Performance Audit – Commercial)**

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Comptroller and Auditor General of India
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Activities of Tamil Nadu Generation and
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P R E F A C E

The Performance Audit Report on the “Power Generation Activities of Tamil Nadu Generation and Distribution Corporation Limited” has been prepared for submission to the Governor of Tamil Nadu under Article 151 (2) of the Constitution of India for being placed in the State Legislature.

This report examines the financial management, operation and maintenance of existing generating plants, capacity additions proposed, coal management, compliance of environmental norms and monitoring and internal control of Tamil Nadu Generation and Distribution Corporation Limited during the period from April 2018 to March 2023.

The audit was conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

Audit wishes to acknowledge the co-operation received from Tamil Nadu Generation and Distribution Corporation Limited at each stage of the audit process.

Executive Summary

EXECUTIVE SUMMARY

1. Why did we select this subject for Audit?

The total installed capacity of the State of Tamil Nadu was around 35,000 MW (March 2023) and that of Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO) was 7,175 MW only, thus contributing merely 20 *per cent* to the State's installed capacity. TANGEDCO's own generation capacity was also in the declining trend despite increase of overall demand in the State. In order to sort out the gap, TANGEDCO resorted to purchase of power at higher cost resulting in significant loss every year. The existing power stations were not maintained properly to maintain their installed capacities and the new projects proposed were also not executed in time. Hence, the Performance Audit on "Power Generation Activities of TANGEDCO" was taken up to examine TANGEDCO's operation and execution of the new projects.

2. How did we conduct the Audit?

The Performance Audit aimed to assess whether the operational performance of the existing power stations and implementation of new projects were carried out economically and effectively. We also analysed whether the financial management of power projects were carried out for intended objectives and coal tie-up for the existing and proposed thermal power stations were done without any slippage. Further, compliance of TANGEDCO with the environmental norms and existence of internal control and suitable monitoring mechanism were also scrutinised.

During the Performance Audit (2018-19 to 2022-23), two out of five each of existing thermal and gas power stations, four out of 47 existing hydro power stations and all the seven ongoing power projects (five thermal and two hydro) were selected for detailed audit. All the Fuel Supply Agreements executed by TANGEDCO for the existing thermal power stations and proposed linkage for ongoing thermal power projects were also analysed. In addition, the proposal for installation of new solar power projects and performance of TANGEDCO owned Wind Electric Generators were also reviewed.

3. Main Audit Conclusion

The major observations pertaining to this Performance Audit are as below:

Planning

The State's requirement of power has been met by TANGEDCO's own generation to the extent of less than one-third only. TANGEDCO failed to capture the initial advantage to improve non-conventional energy sources of solar and wind power, considering lesser gestation period when compared to conventional power projects, obtaining fewer clearances from various departments and lesser cost of generation. TANGEDCO did not have any strategic plan or action plan apart from Government's Vision 2023 document to achieve the capacity addition as envisaged. Further, both the Government and TANGEDCO do not have any policy on conventional or non-conventional

energy sources (except Solar). The thermal projects taken up for execution (6,220 MW) without adequate plan have not achieved the Commercial Operation Date (COD) (March 2024) and are in various stages of completion.

TANGEDCO took five to nineteen years for the award of contract in respect of projects under execution despite availability of approval by the Board.

Both the Government and TANGEDCO do not have separate thermal, hydro and wind policies to tap the potential power at lower cost.

Financial Management

The total accumulated loss of TANGEDCO at the end of March 2023 was around ₹1,60,000 crore. Out of this, the generation activities of TANGEDCO contributed between 17 and 45 *per cent* which was mainly due to failure to implement new projects in time and consequent avoidable interest on loans. The Independent Auditors of TANGEDCO were providing adverse opinion every year in the annual accounts on the basis of non-existence of appropriate internal control over the Financial Reporting in respect of (i) non-analysis of more than ₹21,000 crore lying in various legacy accounts for proper settlement, (ii) unreconciled difference in balances of various inter-unit accounts for about ₹4,000 crore, (iii) non-maintenance of proper records showing the details and situation of fixed assets, (iv) non-registering title deeds in the name of TANGEDCO in respect of most of the lands, etc.

TANGEDCO incurred excess capital cost of more than ₹12,000 crore when compared to the benchmark rate fixed by CERC in respect of new power projects. TANGEDCO has not resolved the manner and strategy for amortization/liquidation of regulatory assets created upto 2021-22. TNERC disallowed more than ₹14,000 crore towards the claim of Fixed and Variable Costs by TANGEDCO due to mixing of revenue and capital accounts, non-achievement of desired load factor by TANGEDCO, etc.

Performance of Thermal Power Stations and Capacity Additions

TANGEDCO's thermal power stations suffered outages due to non-capital overhauling and non-carrying out preventive maintenance in time. Consequently, it incurred avoidable expenditure of around ₹9,500 crore due to purchase of power at higher cost. TANGEDCO incurred generation loss coupled with additional expenditure of more than ₹130 crore due to poor performance and consequent failure of Ash Handling System at NCTPS-II.

On account of shortage in supply of coal and consequent purchase of coal at higher price to meet out the shortage, TANGEDCO incurred additional expenditure of more than ₹3,900 crore. TANGEDCO's failure to switch over to the industrial practice of variable price method from firm price method in respect of imported coal resulted in additional expenditure of more than ₹1,200 crore. Transit loss of coal was above the norms for which no claim was lodged with the suppliers. It was seen that despite the specific availability of clause regarding claiming of shortages from the contractors, TANGEDCO neither calculated the shortage of coal for the past 23 years (2001-24) nor claimed compensation from them. TANGEDCO entered into lumpsum contracts for coal handling considering full capacity of plants instead of normative PLF which resulted in further loss.

Actual grade of coal supplied was below the declared grade and in respect of 17.55 lakh tons of coal, testing was not done/ results were not available. Drop in Gross Calorific Value (GCV) from 'as received' stage to 'as fired' stage was above the Central Electricity Authority norms in respect of both indigenous and imported coal. Acceptance of lower grade coal had led to use of additional quantity of coal to meet out the generation and consequent avoidable expenditure of around ₹1,500 crore. Even though, TANGEDCO had accepted lower grade of coal, it made payment for the coal having GCV as per the test results submitted by the suppliers which led to excess payment.

TANGEDCO made excess payment towards idle freight due to non-inclusion of proper clause in the Fuel Supply Agreement. It also incurred loss of around ₹250 crore due to pre-berth delays in time charters.

It is pertinent to mention that a Performance Audit on Coal Management in Thermal Power Stations of TANGEDCO was conducted covering the five-year period ending 2018-19¹ which highlighted the discrepancies in coal procurement and consumption by TANGEDCO. However, still most of the issues persists leading to additional expenditure to TANGEDCO as illustrated above.

The thermal projects proposed to be completed before March 2023 have not been commissioned and are in various stages (18 to 94 *per cent*) of completion. Delay in achieving COD resulted in time and cost overrun. TANGEDCO has exceeded the norm of 50 months fixed by Central Electricity Regulatory Commission for completing the projects beyond 13 to 56 months (March 2023). Consequently, the increased Interest During Construction (around ₹3,600 crore) in respect of three projects is likely to be disallowed by Tamil Nadu Electricity Regulatory Commission at the time of finalisation of capital cost of projects.

TANGEDCO awarded both Boiler, Turbine & Generator and Balance of Plant works to different contractors by non-including the scope for encasement of cooling water pipeline in either of the contract resulting in damage to the cooling water pipeline in respect of North Chennai Thermal Power Project - III. The BOP contractor did not adhere to the milestones and withdrew their project activities which derailed the project work. The power station is yet to achieve COD (March 2024).

Failure to evaluate the past experience of EPC contractor for Udangudi Thermal Power Project resulted in damage of sacrificial walls of Sea water intake outfall system and consequent delay of the project. Non-compliance to Government directions for providing surplus water channel led to flooding/ water logging with consequential stoppage of construction activities. Consequently, the power plant is yet to be commissioned (March 2024).

Poor workmanship of the contractor awarded for Ennore SEZ Thermal Power Project coupled with construction of coal conveyor transportation system in contravention to the route approved by MoEF delayed the project. External Coal Handling Plant asset created also could not be put into use due to non-

¹ Report No.2 of 2021

commissioning of related works. The power plant is yet to be commissioned (March 2024).

The EPC contract awarded to LANCO for execution of ETPS Expansion Power Project was terminated and another agreement executed with BGRESL. Since BGRESL did not submit the required bank guarantee within the time schedule, its contract was terminated initially and again reinstated based on the recommendation of high level committee without conducting any study on the financial performance/position of the contractor. However, due to poor progress of work by BGRESL (less than one *per cent*), the project could not be implemented within the targeted date and could achieve only 18 *per cent* overall progress even after reinstating (March 2024).

TANGEDCO failed to conduct field study for identification of land for Uppur Thermal Power Project and hence, had to face legal issues with consequent stoppage of works. Only 13 *per cent* of the supplied materials were utilised and materials valuing around ₹2,000 crore are lying idle without beneficial use for more than five years. The project was suspended and TANGEDCO incurred sunk cost of ₹7,545 crore before commissioning of the project.

In respect of long-term linkage for two plants (NCTPS-III and Uppur STPP), TANGEDCO failed to specify the quantum of each grade of coal. Coal block allocation for the remaining three plants (Ennore SEZ, ETPS Expansion, Udangudi) is not yet finalised. In spite of the mandatory provision, thermal power stations discharged effluent treated water outside the plant boundary and the water so let out polluted the river and sea water.

Gas Turbine Power Stations

The Gas Turbine Power Stations consumed excess gas over the norm due to low calorific value of gas supplied resulting in excess expenditure. Non-carrying out preventive maintenance as recommended by Original Equipment Manufacturer in GTPSs resulted in avoidable loss of generation. TANGEDCO failed to address the fluctuations in intra-day gas supplied by GAIL which impacted frequent outages and consequent additional expenditures.

On account of low plant load factor, higher station heat rate and higher auxiliary consumptions, TNERC disallowed energy charges to the extent of ₹76.44 crore which could not be claimed through tariff in respect of the selected gas turbine power stations.

Non-conventional Energy Sources

TANGEDCO took up the Renovation, Modernisation and Uprating work in two hydro stations which were delayed at various stages. Two desiltation works approved also could not be implemented due to non-obtaining clearance from Forest Department. Thus, TANGEDCO lost the opportunity of increasing its power generating capacity of existing hydro power stations.

TANGEDCO has undertaken two hydro power projects (Kundah and Kollimalai) which was scheduled to be commissioned in May 2023 and April 2021 have not been commissioned till now and the progress achieved was 46 *per cent* and 66 *per cent* only (March 2024). Kundah Hydro Power Project is being executed without obtaining Techno Economic Clearance from GOI and TANGEDCO failed to avail the benefits under Mega Power Project.

Inadequate planning for tendering resulted in postpone of the project schedule. The execution of the Kollimalai Hydro Project has been delayed mainly because of delay in acquisition of land.

TANGEDCO failed to implement the solar park by utilising the financial assistance extended by MNRE. Repowering of Wind Electric Generators was also not carried out.

Monitoring and Internal Control

The status of the projects being executed by TANGEDCO is not reported to the Board. The Board was approached only for approvals, but the progress of the projects is not discussed at the Board level.

Lack of focus on timely completion of projects led to significant cost escalations with consequent loss of potential revenue from power generation.

Despite repeated reporting of adverse opinion by the Independent Auditors, TANGEDCO did not address the issues for improvement.

Due to ineffective internal control system, the shortage of coal was not addressed then and there.

4. What do we recommend?

The following major recommendations have been given to TANGEDCO:

- Frame an effective strategic plan/action plan in such a way that the desired results as envisaged by GoTN in Vision 2023 towards capacity addition programme are achieved as planned;
- Clear guidelines/norms should be evolved so that no mixing up of capital and revenue accounts are done.
- Undertake capital overhauling programme as recommended by OEM in the existing power stations to avoid outages and trippings;
- Claim the shortage in supply of coal with the contractors periodically to avoid additional expenditure;
- Consider the test reports of Customs Department for cross-checking the quality of coal before making payments;
- Ascertain the financial strength of the bidders before awarding the contracts in future, considering the failures faced in respect of ETPS Expansion Project;
- Draw up an action plan to resume the project work at Uppur so as to bring the project live and complete the execution work early so as to achieve the desired capacity addition;
- Take up the issue of quantity and quality constraints in supply of gas with GAIL to avoid additional expenditures and amend the agreement accordingly;
- Speed up the RMU activities and desilting work so as to achieve desirable capacity utilization in Kodayar and Moyar power stations;
- Implement the two hydro projects (Kundah and Kollimalai) under construction without further slippages in time schedule to add to the capacity of TANGEDCO;

- Bring to the notice of the Board about the status and progress of projects for discussion periodically; and
- Take effective steps to improve the accounting procedures to overcome the deficiencies pointed out by Auditors and to avoid adverse opinion in future.

Chapter- 1

CHAPTER - 1

Performance Audit on Power Generation Activities of Tamil Nadu Generation and Distribution Corporation Limited

1 Introduction

Power is an essential requirement for all facets of life and has been recognised as a basic human need. The availability of reliable and quality power at competitive rates is very crucial to sustain growth of all sectors of economy. The Government of India (GOI) prepared (February 2005) the National Electricity Policy (NEP) in consultation with the State Governments and Central Electricity Authority (CEA) for accelerated development of the power sector through the Ministry of Power (MoP). The power industry is regulated by the Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commissions.

The installed capacity in the country as on 31 March 2018 was 3,44,002 MW¹ which has reached 4,16,059 MW as on 31 March 2023 with 21 *per cent* increase over the period of five years. The State of Tamil Nadu which owned a capacity of 29,859.99 MW (including private sources) at the end of 2017-18 showed an increase of around 17 *per cent* in 2022-23 i.e. 35,036.16 MW. Out of this, Renewable Energy Sources contributed 18,618.78 MW (53 *per cent*) and Conventional Energy Sources covered 16,417.38 MW (47 *per cent*). As far as TANGEDCO is concerned, the installed capacity of 7,161.45 MW (2017-18) has increased to 7,175.45 MW (2022-23) only (0.20 *per cent*) with a mere increase of 14 MW (2x7 MW) in hydro sector which shows the slow progress of TANGEDCO in meeting the demand.

1.1 Role of TANGEDCO

Erstwhile Tamil Nadu Electricity Board (TNEB) was re-organised (2010) into TNEB Limited, Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO) and Tamil Nadu Transmission Corporation Limited (TANTRANSCO). Accordingly, generation of power was carried out by TANGEDCO. Subsequently, under the Tamil Nadu Electricity Restructuring and Transfer Scheme, 2024, TANGEDCO has been restructured (March 2024) into Tamil Nadu Power Generation Corporation Limited² (TNPGL), Tamil Nadu Green Energy Corporation Limited³ (TNGECL) and Tamil Nadu Power Distribution Corporation Limited (TNPDCCL)⁴. During the review period, the generation activities were under TANGEDCO only.

The installed capacity of 7,175.45 MW (March 2023) consists of five thermal power stations (4,320 MW), five gas turbine power stations (516.08 MW), 47

¹ As per CEA Report of March 2018

² TNPGL covers power stations/projects using conventional fuel like, Thermal and Gas

³ TNGECL covers power stations/projects using non-conventional fuel like Hydro, Wind and Solar

⁴ GoTN's order dated 24 January 2024 and 6 March 2024

Hydro power stations (2,321.90 MW) and 110 Wind Electric Generators (17.465 MW), as detailed in **Table 1** below.

Table 1: Details of power stations owned by TANGEDCO

Category of Power Plants	Name of the Power Stations	Capacity of the Stations (MW)/ Units	Total Capacity (MW)	Year of Commissioning
Thermal	TTPS	210 x 5	1,050.00	1991
	MTPS-I	210 x 4	840.00	1990
	NCTPS-I	210 x 3	630.00	1996
	MTPS-II	600 x 1	600.00	2013
	NCTPS-II	600 x 2	1,200.00	2014
Total of Thermal Stations (a)			4,320.00	
Gas	Basin Bridge	30 x 4	120.00	1996
	Kuttalam	101x1	101.00	2004
	Valuthur Ph – I	95x1	95.00	2003
	Valuthur Ph – II	92.2x1	92.20	2008
	Thirumakottai (Kovilkalappai)	107.88x1	107.88	2001
Total of Gas Stations (b)			516.08	
Hydro	Irrigation Based @	0.35 to 100	891.25	1933 to 2016
	Non-Irrigation Based @@	0.70 to 180	1,430.65	1932 to 2005
Total of Hydro Stations (c)			2,321.90	
Wind	Wind Energy Generators (110)	0.20 to 4.20	17.47	1986 to 1992
Total of Wind Energy Generators (d)			17.47	
Total of TANGEDCO's own Generating capacity (a) + (b) + (c) + (d)			7,175.45	

Source: Statistics at a Glance by TANGEDCO (@ 29 power stations; @@ 18 power stations)

TANGEDCO is executing (March 2023) seven projects for an installed capacity of 6,220 MW viz. five thermal power projects (5,700 MW) and two hydro power projects (520 MW) as detailed in **Table 2** below:

Table 2: Details of power projects under execution

Sl. No.	Project	Source	Capacity (MW)	Expected Date of completion
1	North Chennai - III	Thermal	1 x 800	December 2024
2	Udangudi	Thermal	2 x 660	June 2025
3	Ennore SEZ	Thermal	2 x 660	March 2026
4	ETPS Expansion	Thermal	1 x 660	Shelved
5	Uppur	Thermal	2 x 800	On hold (March 2021)
6	Kundah - VII	Hydro	4 x 125	December 2024
7	Kollimalai	Hydro	1 x 20	October 2025

Source: Data provided by TANGEDCO

Note: All the Thermal Stations are Super Critical Thermal Power Stations⁵ (STPPs)

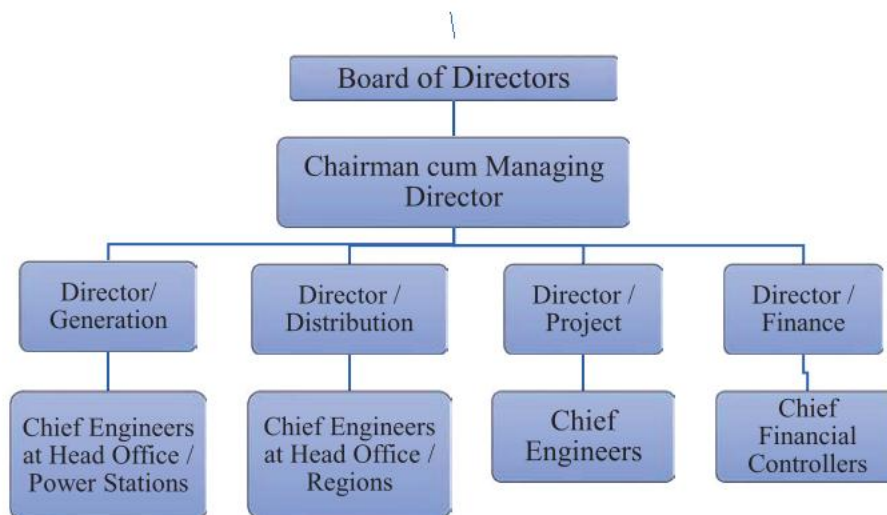
⁵ STPPs are stations with Installed Capacity of 600 MW and above

The deficiencies in increasing the installed capacity of existing power stations and new projects are explained in the succeeding chapters.

1.2 Organisational Setup

TANGEDCO is functioning under the administrative control of Energy Department and its management is vested with the Board of Directors appointed by Government of Tamil Nadu (GoTN). The organisational chart of TANGEDCO is given below in **Chart 1**.

Chart 1: Chart showing the organogram of TANGEDCO



Source: Data furnished by TANGEDCO

1.3 Audit Objectives

The main objectives of the Performance Audit are to ascertain whether:

- Operational performance of existing power plants and improvements to the existing plants were carried out as per plan ;
- Capacity additions of power projects were planned properly for execution within time by TANGEDCO to meet the growing demand of power;
- Fuel and financial Management of existing and ongoing power projects were carried for intended objectives; and
- Internal control and Monitoring mechanism for existing and ongoing power projects were adequate.

1.4 Audit Criteria

The following Audit Criteria were considered for the Audit in assessing the performance of TANGEDCO:

- Energy Conservation Act 2001, Electricity Act 2003, National Electricity Plan, Tariff Policy (GOI), Companies Act 2013, Tamil Nadu Transparency in Tenders Act 1998 (TNTIT) and Rules, 2000, Solar policy of GOI/GoTN;

- Guidelines/instructions of MoP, Ministry of Coal (MoC), Ministry of New and Renewable Energy (MNRE), CERC, CEA, Tamil Nadu Electricity Regulatory Commission (TNERC);
- Vision Tamil Nadu 2023 of GOTN and Policy Notes of Energy department, GoTN
- Annual Accounts, Statistics at a Glance, Management Information System (MIS) and Board Meetings of TANGEDCO; and
- Administrative and Technical approvals, Detailed Project Reports and Tender documents.

1.5 Audit Scope and Methodology

The Performance Audit on ‘Power Generation Activities of Tamil Nadu Electricity Board’ was included in the Report of the Comptroller and Auditor General of India for the year ended 31 March 2010 (Report No. 4) and was discussed (February 2019) in the Committee on Public Undertakings (COPU) and further communication from COPU/Tamil Nadu Legislative Assembly Secretariat is awaited (March 2025). Further, Performance Audits on ‘Augmentation of Thermal Generation Capacity of TANGEDCO’, ‘Operational Performance of Gas Turbine Power Stations of TANGEDCO’ and ‘Coal Management in Thermal Power Stations of TANGEDCO’ were included in the Report of the Comptroller and Auditor General of India for the year ended 31 March 2013 (Report No. 1 of 2014), 31 March 2017 (Report No. 5 of 2017) and 31 March 2019 (Report No. 2 of 2021) respectively, and are yet to be discussed by COPU. The status of these reports is given in **Annexure-1**.

In the above-mentioned latest Audit Report (Coal Management in Thermal Power Stations of TANGEDCO), Audit had mainly recommended to review the coal supply agreements to include penal clause for coal shortages and to analyse the reasons for excess loss of GCV over and above the CEA norms. However, TANGEDCO has not addressed these issues so far (March 2024).

The present audit covers the power generation activities of TANGEDCO (both existing and proposed capacity additions) from 2018-19 to 2022-23. The Performance Audit commenced with a Pilot Study in April 2023. An Entry Conference was conducted on 05 June 2023 in which Audit Objectives, Criteria and Methodology of the PA was explained to the Secretary to Government, Energy Department/GoTN and Chairman and Managing Director (CMD)/ TANGEDCO. During the course of audit, the records at Energy and Finance Department, TANGEDCO Headquarters, power plants and project offices were scrutinised. The methodology adopted for achieving audit objectives involved scrutiny of physical/digital records, analysis of data collected, conducting joint physical inspection, raising of audit enquiries, discussion with the management and issue of report to the management. The audit observations were issued to TANGEDCO, and the replies received from them have been incorporated in the report wherever considered necessary.

An exit conference for the performance audit to discuss the audit findings was held (06 November 2024) which was attended by the Principal Secretary to Government/ Energy Department, Managing Director/TANGEDCO and other senior functionaries. The replies (January 2025) of the Government and

TANGEDCO to the audit observations have been incorporated in the Report appropriately.

1.6 Audit Sampling

The Performance Audit covered detailed audit of eight existing power plants and seven ongoing projects as given in **Table 3** below:

Table 3: Power Stations/Projects selected for detailed audit

(in MW)

Category	Existing Stations				Capacity Addition				Total			
	Power Stations		Selected for Audit		Power Stations		Selected for Audit		Total Power Stations		Selected for Audit	
	Numbers	Capacity (MW)	Numbers	Capacity (MW)	Numbers	Capacity (MW)	Numbers	Capacity (MW)	Numbers	Capacity (MW)	Numbers	Capacity (MW)
Thermal	5	4,320	2	1,800	5	5,700	5	5,700	10	10,020	7	7,500
Gas	5	516	2	193	0	-	0	-	5	516	2	193
Hydro	47	2,322	4	326	2	520	2	520	49	2,842	6	846
Wind	110	17	110	17	0	0	0	0	110	17	110	17
Total	167	7,175	118	2,336	7	6,220	7	6,220	174	13,395	125	8,556

Source: Statistics at a Glance

Thermal and Gas power stations that have not outlived their useful life have been selected for audit and covered 42 *per cent* and 39 *per cent inter se* of their installed capacity (1,800 MW and 193 MW respectively). In respect of Hydro stations, non-irrigation based stations accounting to 20 *per cent* of installed capacity (326 MW) has been selected. However, all the seven projects (thermal and hydro) being implemented by TANGEDCO during the audit period have been selected for Audit. In addition, Audit reviewed the performance of existing TANGEDCO owned Wind Electric Generators (WEGs) of 17 MW capacity and the executed/proposed solar power projects.

1.7 Acknowledgement

Audit acknowledges the cooperation and assistance extended by the Department of Energy, Department of Finance, management of TANGEDCO and all the officials in smooth conduct of this performance audit.

1.8 Structure of the Report

Chapter 2 on Planning covers the power scenario in the State, generation capacity of TANGEDCO and its share to the State in terms of generation and capacity, planning for augmentation of capacities, absence of important policies, etc.

Chapter 3 on Financial Management covers the overall financial health of TANGEDCO and its generation activities, discrepancies in disbursement of loans, non-recoupment of regulatory assets, non-filing of tariff petitions in time, disallowance of various claims of TANGEDCO by TNERC and its impact, revenue gap and loss funding by Government.

Chapter 4 on Performance of Thermal Power Stations and Capacity Additions covers the operational performance of existing thermal power stations, coal supply agreements, procurement of coal and discrepancies thereon, environmental impacts, issues related to capacity additions planned and being executed, coal linkages to ongoing projects, etc.

Chapter 5 of the Report covers the operational and financial performance of existing **Gas Turbine Power Stations**, gas supply agreement and issues related to purchase of gas, etc.

Chapter 6 on **Non-Conventional Energy Sources** covers the Renovation, Modernisation and Uprating/Desilting work planned in the existing hydro power stations, new hydro projects being implemented, solar power project planned and performance of existing wind electric generators.

Chapter 7 on **Monitoring and internal control** covers the periodical monitoring of new projects, effectiveness of project monitoring and internal control issues.

Audit recommendations on the key audit findings have been included under respective chapters.

Chapter – 2

CHAPTER-2

Planning

TANGEDCO's own generation capacity decreased from 23.52 per cent to 20.48 per cent of the share of the State during the Audit period (2018-23)

Out of 13 projects planned to be implemented by TANGEDCO, only seven projects have been taken up for execution. The projects taken up also could not be completed as scheduled.

TANGEDCO does not have either strategic plan or action plan to implement/execute the new projects for capacity addition programme. Even though the capacity of the State in respect of Renewable Energy has increased, TANGEDCO failed to increase its capacity in the States' share.

The State/TANGEDCO does not have a separate thermal, hydro and wind policy.

Demand for electricity is expected to continue to expand as a result of economic and population growth along with increased urbanisation and industrialisation. The challenges faced by the country/State is how to (i) meet the growing demand, (ii) expand energy access and (iii) integrate renewable energy, in order to achieve economic, social and climate objectives. The peak energy demand, energy requirement and the ways of meeting the same by the State are explained in the succeeding paragraphs.

2.1 Power scenario in Tamil Nadu

Tamil Nadu is one of the most industrialised States where the requirement for power is expanding at a rapid phase. The growth of economy depends on the availability of power.

The State's peak electricity demand has seen a sharp increase (13.94 per cent) over the period of five years from 15,844 MW (2018-19) to 18,053 MW (2022-23). The power demand has been met by maximising all available sources and optimising the power purchase from the day ahead and real time market. Due to improper planning and failure in implementing the planned power projects within the scheduled period of time (as discussed in Chapter 4 and 6), TANGEDCO resorted to incur heavy expenditure towards purchase of power.

The details of energy requirement of the State and energy available from TANGEDCO's own generation through various sources during the review period 2018-19 to 2022-23 is given in **Table 4** below:

Table 4: Contribution of TANGEDCO to State's requirement

Period	Own Generation (MU)					Requirement (MU)	Share of Own Generation to total requirement (percentage)
	Conventional		Renewable		Total		
	Thermal	Gas	Hydro ¹	Wind			
2018-19	25978.00	1875.00	5472.00	3.30	33328.30	109482.00	30.44
2019-20	21566.00	1710.00	4964.00	4.45	28244.45	108816.00	25.96
2020-21	15554.00	1722.00	5387.00	4.00	22667.00	101194.00	22.40
2021-22	20391.11	1460.23	5514.00	3.39	27368.73	110191.00	24.84
2022-23	22689.18	1776.76	6174.00	3.44	30643.38	114949.00	26.66

Source: Load Generation Balance Report of Central Electricity Authority and Statistics at a Glance of TANGEDCO

The State's requirement has been met by TANGEDCO's own generation to the extent of less than one third and was fluctuating between 22.40 *per cent* and 30.44 *per cent*. The balance of requirement was met by purchase of power from Central Generating Stations (CGS), Independent Power Producers (IPPs), other generators, viz., Wind, Solar, Captive Power Producers (CPP), Cogen, biomass, etc., and through open purchases as detailed in **Table 5** below.

Table 5: Details of sources of power purchased by TANGEDCO (in MUs)

Year/ Source	CGS	IPP	Wind	Solar	Others (IPP, Cogen, Biomass)	Open Purchase	Total
2018-19	30,583	2,225	12,597	3,556	378	31,123	80,462
2019-20	28,708	2,381	12,495	4,947	309	37,145	85,985
2020-21	28,941	1,187	12,552	6,115	299	35,303	84,397
2021-22	37,084	1,566	13,117	7,203	364	30,858	90,192
2022-23	40,296	2,029	13,281	9,973	425	25,687	91,691

Source: Statistics at a Glance of TANGEDCO

2.1.1 Power Generation Capacity of TANGEDCO

The total installed capacity (31 March 2023) of the State was 35,036.16 MW and that of TANGEDCO was 7,175.45 MW (Conventional: 4,836.08 MW and Non-conventional: 2,339.37 MW), contributing only 20 *per cent*. TANGEDCO's own generation capacity in comparison to the State is given in **Table 6** below:

¹ Hydro generation has been considered as Renewable Energy Source vide CEA Memorandum dated 08.03.2019.

Table 6: TANGEDCO's share of installed capacity in comparison with the State**(in MW)**

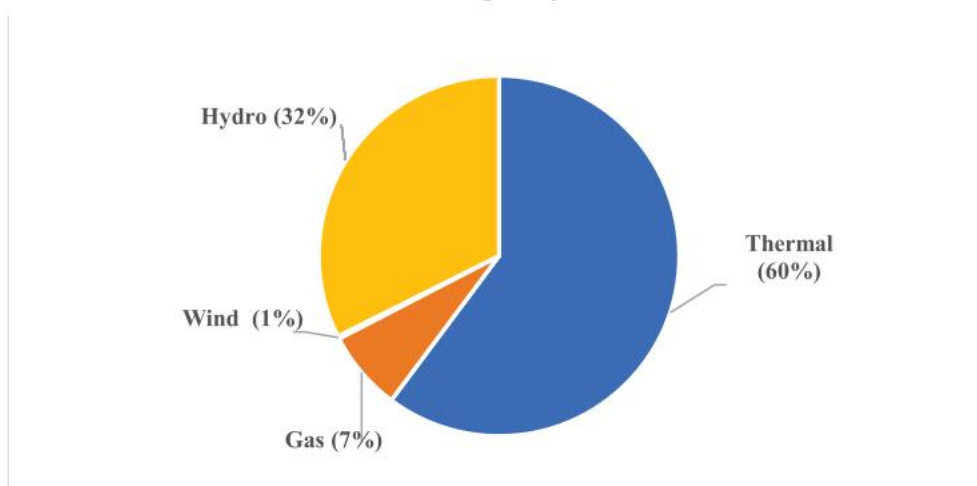
Year	Installed Capacity of TANGEDCO (in MW)				Installed Capacity of State	Share of TANGEDCO to State	
	Conventional		Renewable				Total
	Thermal	Gas	Hydro	Wind			
2018-19	4,320.00	516.08	2,314.90	17.47	7,168.45	30,479.31	23.52
2019-20	4,320.00	516.08	2,321.90	17.47	7,175.45	31,905.87	22.49
2020-21	4,320.00	516.08	2,321.90	17.47	7,175.45	32,595.06	22.01
2021-22	4,320.00	516.08	2,321.90	17.47	7,175.45	33,877.31	21.18
2022-23	4,320.00	516.08	2,321.90	17.47	7,175.45	35,036.16	20.48

Source: Statistics at a Glance by TANGEDCO (2022-23)

TANGEDCO's own generation capacity decreased from 23.52 to 20.48 *per cent* on the share of the State during the audit period. The latest capacity addition of 600 MW (Thermal) and 7 MW (Hydro) was effected during 2014-15 and 2019-20 respectively. The envisaged planned capacity addition has not been done by the State, except by the private generators and the overall share of TANGEDCO to the State was around one-fifth as of March 2023.

2.1.2 Generation Capacity Mix of TANGEDCO

TANGEDCO generates power through Thermal (Coal), Gas (Natural Gas), Hydro (Rivers/Reservoirs/Dams) and Wind Energy Generators. The generation capacity mix of TANGEDCO's installed capacity (7,175 MW) is depicted in **Chart 2** below:

Chart 2: Generation capacity mix of TANGEDCO

Source: Statistics at a Glance by TANGEDCO (2022-23)

The generation capacity mix of TANGEDCO does not include any Solar Capacity though Tamil Nadu is a pioneer in Solar Energy (in private sector). Also, TANGEDCO installed Wind Energy Generators (WEGs) way back in 1987 as a Pilot Project which paved way for private WEG's (8,721.55 MW) in Tamil Nadu, whereas its wind capacity of 17.47 MW remained the same since its installation. However, private developers have commissioned their

Solar projects and WEGs for which TANGEDCO had created infrastructure facilities for evacuation of power.

As per the generation capacity mix of the country, coal/lignite contributed over half the capacity (51 *per cent*) followed by Solar (16 *per cent*), Hydro (12 *per cent*), Wind (10 *per cent*) and the rest (Gas, Nuclear and Biomass with 11 *per cent*) as of March 2023. TANGEDCO failed to capture the initial advantage to improve non-conventional energy sources of solar and wind power, considering lesser gestation period when compared to conventional power projects, obtaining fewer clearances from various departments and lesser cost of generation and consequent inclusion in the merit order despatch. This omission by TANGEDCO resulted in non-augmentation of Non-Conventional Energy Sources (Solar and Wind) at cheaper rates which is not only a pointer towards faulty planning, but also resulting in high expenses towards power purchase thus depicting its short sightedness.

2.2 Planning to increase the power capacity by GoTN

During the last phase of 11th Plan period (2011-12), the peak demand of the State (10,713 MW) has crossed the installed capacity (conventional) of the State (10,364 MW). Hence, GoTN has planned to meet the future power demand by releasing (March 2012) one document called 'Vision 2023' which targeted expeditious additions to conventional and non-conventional power generation capacity to be completed and commissioned before March 2023.

Phase-I of the Vision Document pertains to vision formulation, and investment in Energy Sector was planned for ₹4,50,000 crore² (out of which ₹1,90,000 crore relates to new projects). Based on the discussion with the Tamil Nadu Infrastructure Development Board³ (TNIDB), modification was made and the proposed investment in Energy Sector was revised to ₹3,89,335 crore (out of which ₹1,87,185 crore relates to new projects of TANGEDCO) in the Second Phase of Vision 2023 brought out in February 2014. Phase-II contained detailed sector reports and project profiles.

2.2.1 Power projects planned by GoTN and implemented by TANGEDCO

The projects envisaged in Vision 2023 for the Energy Sector involved both the State Sector and Private Sector for execution. The details of power generation projects planned and taken up by TANGEDCO for execution is given in **Table 7** below:

² Includes Generation, Distribution and Transmission projects of TANGEDCO and other private generation projects.

³ TNIDB was established under the 'Tamil Nadu Infrastructure Development (TNID) Act 2012 to formulate sectoral policies, evaluate and recommend projects to the Government, designate Implementing Agency, recommend financial support etc.

Table 7: Details of power projects planned and implemented by TANGEDCO

Source of Power	Planned for State			Planned for TANGEDCO			Taken up by TANGEDCO		
	Projects Nos	Capacity (MW)	Cost (₹ in crore)	Projects Nos	Capacity (MW)	Cost (₹ in crore)	Projects Nos	Capacity (MW)	Cost (₹ in crore)
Thermal	10	10,120	60,573	8	8,520	50,973	5	5,700	53,041
Gas \$	1	1,000	4,000	-	-	-	-	-	-
Hydro	5	2,750	10,112	5	2,750	10,112	2	520	3,807
Solar \$	-	5,000	50,000	-	-	-	-	-	-
Wind	-	10,000	60,000	-	-	-	-	-	-
Offshore Wind	-	200	2,500	-	-	-	-	-	-
Total	16	29,070	1,87,185	13	11,270	61,085	7	6,220	56,848

Source: Vision Tamil Nadu 2023 Phase-2

\$ planned for execution under PPP mode

Out of the 16 projects planned for the state, 13 were to be financed through the State. TANGEDCO took up only 55 *per cent* of planned capacity for execution. The balance 2,820 MW of Thermal and 2,230 MW⁴ of Hydro capacity projects are still in preliminary stage. 5,000 MW of Solar projects planned under PPP mode were being executed entirely by private developers and 1,000 MW Gas project planned under PPP mode is yet to be taken up (March 2024).

2.2.2 Absence of strategic planning/action plan for the capacity addition

The project and programme profiles and ideas are intended to be converted into feasibility reports, detailed project reports and specific schemes. They were to be taken up for implementation by different agencies with some facilitation by GoTN. The individual line departments were to act effectively to ensure that the Vision is realised.

However, it was noticed that TANGEDCO did not have any strategic plan or action plan apart from Vision 2023 to achieve the capacity addition programme as envisaged by GoTN in a phased manner to achieve the desired result within the scheduled period to minimise the purchase of power at higher cost. Thus, it is evident that, over and above the preparation of vision document more than a decade ago, there was no implementation plan/schedule for implementing high money value capital projects. Audit further noticed failures and delays at each stage (pre-award and post-award) resulting in non-achievement of envisaged benefit despite lapse of more than 10 years from the date of inclusion of the projects in the Vision Document of GoTN. Resultantly, the projects which were taken up for execution without adequate plan has not achieved Commercial Operation Date (COD) till March 2024.

While responding to the above, TANGEDCO stated (February 2025) that there were no new projects planned by it apart from Vision 2023 action plan. While seeking further clarification on the availability of any strategic plan or action plan for the capacity addition programme, it was clarified that it would formulate a Resource Adequacy Plan shortly to forecast the generation for the next 10 years commencing from 2024-25 onwards.

⁴ 2,200 MW have been approved (December 2023) for execution under PPP mode

Thus, it could be seen from the above that TANGEDCO did not have any strategic plan or action plan to implement/execute the capacity addition programme as envisioned in the Vision 2023 (way back in 2012) document of GoTN. Hence, the implementation did not have any suitable roadmap for achievement of its goal.

2.2.3 Ineffective implementation of projects by TANGEDCO

The seven projects being executed by TANGEDCO as per Vision 2023 were already approved by the GoTN/Board of TANGEDCO between 1995 and 2013 for implementation as detailed in **Table 8** below.

Table 8: Details of power projects approved by GoTN/ TANGEDCO Board

No.	Project	Date of approval by GoTN	Date of approval by Board	Date of award of tender
1	NCTPS - III	26 October 2010	14 June 2010	29 January 2016
2	Udangudi	01 February 2013	16 May 2007	07 December 2017
3	Ennore SEZ	01 February 2013	05 January 2009	27 September 2014
4	ETPS Expansion	30 March 2012	05 September 2006	30 May 2014/ 09 March 2022
5	Uppur	24 October 2011	20 August 2010	27 February 2016
6	Kundah - VII	28 June 2007	22 December 2008	15 February 2018
7	Kollimalai	04 September 1995	10 July 1997	28 December 2016

Even though TANGEDCO was aware of the fact of shortage in capacity and consequent expenditure towards purchase of power to meet out the demand, it did not plan properly to finalise the tenders in time. It took five to nineteen years for the award of contract despite availability of approval by Board. Further, the capacity addition as planned did not materialise till date (March 2024) on account of TANGEDCO's failures at various stages. The delays and consequences are explained in Chapter-4 (Thermal Power Stations) and Chapter-6 (Non-Conventional Energy Sources).

2.3 State specific Energy Policies

Conventional energy sources primarily include fossil fuels viz., Coal and Natural Gas. They are major contributors to environmental pollution and climate change. Renewable sources, such as solar, wind and hydroelectric are being increasingly adopted due to their sustainability and lower environmental footprint. Audit noticed that neither the GoTN nor TANGEDCO has a policy on Conventional and Non-conventional energy sources (except Solar).

2.3.1 Absence of Repowering policy for Wind Energy

Ministry of New and Renewable Energy (MNRE) released the policy for Repowering⁵ of the Wind Power Projects in 2016, wherein the capacity of wind turbine generators of one MW and below were eligible for repowering. The scheme provided for an additional interest rebate of 0.25 *per cent* over and above the rebates available to the new wind projects being financed by Indian Renewable Energy Development Agency (IREDA).

⁵ Upgrading the lower capacity turbines of WEGs with improved and higher capacity WEGs

This policy was revised⁶ in 2023, in order to enable repowering/replacement of older generation turbines with newer efficient turbines and refurbishment of wind turbines for life extension beyond design life. The revised policy enabled that all the wind turbines (including owned by private generators) below two MW which had completed the design life and/or turbines after 15 years of installation can go for repowering or refurbishment and avail fiscal and financial benefits available to the new wind projects.

Similar to GOI's policy, the States of Gujarat (2016), Andhra Pradesh (2019) and Rajasthan (2023) have evolved their own policy which provided appropriate fiscal incentives to developers for undertaking repowering in those sites in order to make them economically viable. Tamil Nadu, being second to Gujarat in wind energy generation and having high potential for repowering, does not have a State specific policy. TANGEDCO's failure in repowering its outdated WEGs is brought out in Chapter-6.

2.3.2 Absence of Hydro Policy

The first Hydro Development Policy was formulated by GOI in August 1998 (subsequently revised in 2008, 2014 and 2019) with the objective of undertaking measures for exploitation of the vast potential in the country. MNRE formulated exclusive Small Hydro Power Policy in November 2009 (Power Projects less than 25 MW) which was revised in July 2014. Further, Hydro Policy, 2019 declared Large Hydro Power Projects (LHPs) (more than 25 MW) under Renewable Energy Source.

Tamil Nadu does not have a separate Hydro Policy of its own whereas, 20 States⁷ have formulated their own policy with benefits that would include capital subsidy, interest subsidy, easy Environmental Clearance and providing land at concessional rates. The capacity share of Hydro generation to the total generation of TANGEDCO accounted for 32 *per cent* and the entire installed capacity (2,321.90 MW) of the State belongs to TANGEDCO. There is no significant addition in the installed capacity of hydro plants during the audit period but for uprating of 7 MW in 2019-20.

Non-availability of a State specific policy on hydro generation resulted in lack of motivation/incentive for increased share of hydro power in the State.

⁶ National Repowering & Life Extension Policy for Wind Power Projects, 2023

⁷ Gujarat, Maharashtra, Karnataka and others including five North East States

Recommendations:

TANGEDCO should:

- **Frame an effective strategic plan/action plan in such a way that the desired results as envisaged by GoTN in Vision 2023 towards capacity addition programme are achieved as planned.**
- **Take effective action to increase the share of non-conventional energy sources considering its lesser gestation period and fewer clearances; and**

The Government may frame separate Conventional, Hydro and Wind policies for the State to tap the potential power at lower cost and based on the State's policies, TANGEDCO should evolve its own policies.

Chapter - 3

CHAPTER -3

Financial Management

TANGEDCO's accumulated losses have increased by 29.12 per cent over the period of four years from 2019-20 to 2022-23. The losses in respect of generation activities ranged between 17 and 45 per cent when compared to overall losses.

The outstanding debt over the same period was increasing because of higher loans availed by TANGEDCO.

TANGEDCO incurred excess capital costs when compared to the benchmark rate fixed by CERC. It has not resolved the manner and strategy for amortization/liquidation of regulatory assets created upto 2021-22.

TNERC disallowed significant amount towards Fixed/Variable Costs due to mixing of revenue and capital accounts, non- achievement of desired load factor, etc.

3.1 Financial Performance of TANGEDCO

The financial performance of TANGEDCO for the four-year period 2019-20 to 2022-23¹ is given in **Table 9** below.

Table 9: Financial Performance of TANGEDCO

(₹ in crore)					
No	Year/ Particulars	2019-20	2020-21	2021-22	2022-23
1	Total Income	54,407.68	54,234.17	62,799.35	82,399.91
2	Total Expenditure	67,963.01	67,024.63	75,794.97	93,268.17
3	Loss	13,555.33	12,790.46	12,995.62	10,868.26
4	Accumulated Losses	1,25,852.70	1,38,643.16	1,51,638.78	1,62,507.04
5	Equity Share Capital	20,057.87	20,057.87	20,061.17	20,119.16
6	Net worth (5-4)	(-) 1,05,794.83	(-)1,18,585.29	(-)1,31,577.61	(-) 1,42,387.88

Source: Annual Accounts of TANGEDCO- Ind AS

From the above table, it could be seen that the total accumulated losses at the end of March 2023 was ₹1,62,507.04 crore which has shown an increase of 29.12 *per cent* (over a period of four years ending 2022-23) and consequently, the net worth stands eroded by 34.59 *per cent* during the same period. The poor financial health of TANGEDCO is attributed to key factors viz., substantial technical and commercial losses, increased power procurement expenses, and debt burden (as explained in the following **Table 10**) apart from operational inefficiencies (as indicated in Chapters 4 to 6).

¹ TANGEDCO prepared their accounts in Ind AS w.e.f. 2020-21. PY figure for 2019-20 has also been adopted from Ind AS accounts.

Table 10: Details of AT&C Losses, Cost of Power Purchase and Debts

Year/ Particulars	2018-19	2019-20	2020-21	2021-22	2022-23
AT&C Loss – in MUs/ percentage	16,234/ 15.08	13,337/ 12.39	12,208/ 12.09	13,097/ 12.05	9,870/ 10.20
Cost of Power Purchase (₹ in crore)	44,178.31	33,972.01	34,178.40	39,365.23	50,990.78
Debts (₹ in crore)	1,06,100.32	1,16,638.86	1,34,119.89	1,38,916.09	1,49,810.06
Finance Cost (₹ in crore)	8248.19	8,922.83	10,892.96	10,923.25	13,450.60

Source: Statistics at a Glance and Annual Accounts of TANGEDCO

TANGEDCO's losses were compounding because of (i) issuance of tariff orders with significant time lag (tariff order for the control period² from FY 2022-23 to FY 2026-27 was issued in September 2022 and the previous one was issued in August 2017), (ii) more reliance on external borrowings (41.20 *per cent* increase) resulting in high finance cost (63.07 *per cent* increase), as exhibited in the above table and (iii) subdued utilisation of generation assets (due to non-commissioning of projects under execution), etc.

In this connection, it is pertinent to mention that in the true up order (August 2024), TNERC noted that the Independent Auditors provided Adverse Opinion on substantial aspects related to assets accounting and revaluation in the Annual Accounts of TANGEDCO. The Independent Auditors further stated that the standalone financial statements did not give the information required by the Companies Act, 2013 in the manner so required and did not give a true and fair view in conformity with the Indian Accounting specified under section 133 of the Act (Ind AS) of the state of affairs of the company and its loss, its cash flows and the changes in equity for the year ended on that date.

It was further noticed that the Independent Auditors of TANGEDCO were providing adverse opinion every year (2016-17 onwards) in the annual accounts on the basis of non-existence of appropriate internal control over Financial Reporting in respect of the following issues:

- i) Balances lying in various legacy accounts amounting to ₹21,422.78 crore (March 2023) have not been analysed for proper settlement.
- ii) Unreconciled difference in balances of various inter-unit accounts of TANGEDCO to the extent of ₹4,138 crore.
- iii) Inclusion of unexplained balances in the balance sheet under various categories of assets and liabilities for about 10 years.
- iv) Non-maintenance of proper records showing the details and situation of property, plant and equipment.

² Control Period refers to a defined period during which certain regulations, tariff structures, or norms are applicable and remain unchanged unless explicitly revised by the Commission.

- v) Non-registering title deeds in the name of TANGEDCO in respect of most of the lands.
- vi) Non-availability of sufficient supporting documents to confirm the built-up area in respect of building and other civil works;
- vii) Due to absence of confirmation and validation and correctness of data of employees and pensioners' master data, the auditors were unable to confirm the completeness and accuracy of data provided to the actuary for valuing gratuity liability, pension liability, earned leave liability etc.

TANGEDCO stated (December 2024) that special consultants (Accounting Profession Firms) would be engaged for analysing legacy account balances and to suggest proper adjustment entries for rectification before March 2026. It was also stated that discussion with SAP and its developers were being carried out for refining financial reporting. However, the fact remains that the above highlighted discrepancies/lapses are existing for years together and TANGEDCO did not take effective action to address the issues till date to clean up its accounts and show the correct balances of assets and liabilities.

3.1.1 Financial Performance of Generation activities of TANGEDCO

The details of financial performance of TANGEDCO (Generation) are given in the **Table 11** below:

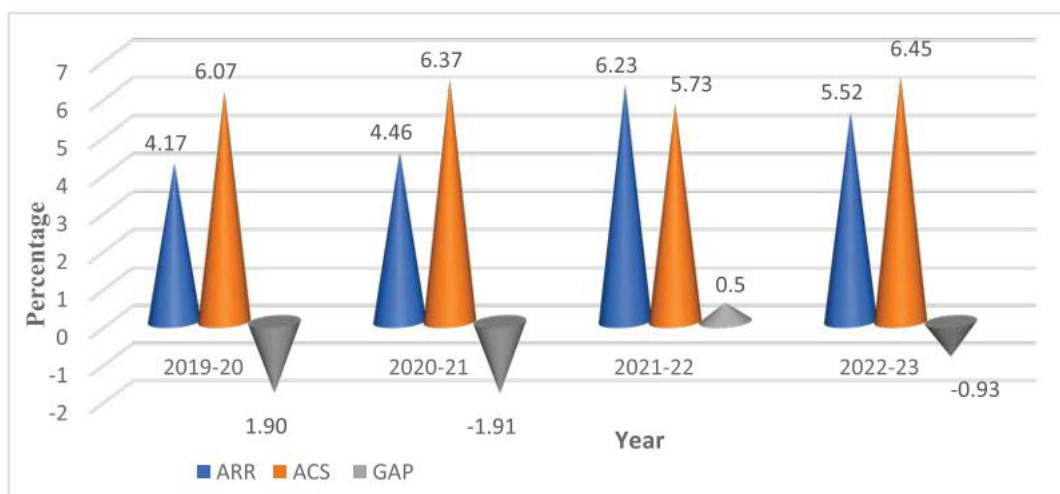
Table 11: Details of financial performance of TANGEDCO (Generation)

No	Particulars	2019-20	2020-21	2021-22	2022-23
1	Net Generation Units (MU)	25,977	20,870	25,162	28,231
2	Generation Segment Revenue (₹ crore)	10,841.71	9,307.37	15,663.68	15,573.72
3	Generation Segment Expense (₹ crore)	15,765.25	13,315.15	14,413.94	18,221.25
4	Generation Segment profit/loss (2 – 3)	-4,923.54	-4,007.78	1,249.74	-2,647.53
5	ARR (2/1)	4.17	4.46	6.23	5.52
6	ACS (3/1)	6.07	6.38	5.73	6.45
7	Gap (5 – 6)	-1.90	-1.91	0.50	-0.93

Source: Annual Accounts of TANGEDCO-Ind AS

It could be seen from the above segment results (related to Generation activities) that the loss ranged between ₹2,647.53 crore (17 *per cent*) and ₹4,923.54 crore (45.41 *per cent*) when compared to the total loss of TANGEDCO. It managed to earn profit for one year (2021-22) due to implementation of new tariff order.

The impact of the above loss and the resultant gap between Average Realisable Revenue (ARR) and Average Cost of Supply (ACS) are depicted in **Chart 3** below:

Chart 3: Details of ARR, ACS and the revenue gap (in percentage)

Source: Annual Accounts of TANGEDCO (2019-20 to 2022-23)

The loss was mainly on account of (i) non-maintenance of the existing power stations properly leading to outages and avoidable expenditures and (ii) TANGEDCO's failure in carrying out new projects in time and consequential avoidable additional interest payments. The discrepancies observed in this regard are dealt in the subsequent Chapters (4 to 6). The gap between ACS and ARR will lead to additional loss to TANGEDCO which will be difficult to recoup.

The Government replied (January 2025) that in order to avail non-conventional energy sources and also to maintain grid stability, Load Despatch centre has issued instructions then and there to back down TANGEDCO's own generation. Hence, generation has been decreased even though the Plant Availability Factor was within TNERC norms.

The reply is not acceptable since the reserved outages based on the instructions of Load Despatch centre was because of poor ranking of power stations in Merit Order Despatch on account of higher variable cost only. In addition, the loss of generation was also due to forced outages due to avoidable reasons as explained in Chapters 4 to 6.

3.2 Funds/Debt Management of TANGEDCO

Debt is a crucial aspect affecting TANGEDCO's financial stability. The details of outstanding debt are given in **Table 12** below:

Table 12: Comparison of total loan of TANGEDCO between Generation and Distribution

Year	Total Loan of TANGEDCO (₹ in crore)	Total Generation Loan (₹ in crore)	Percentage of generation loan with TANGEDCO	Total Distribution loan (₹ in crore)	Percentage of distribution loan with TANGEDCO	Total generic loan ³ (₹ in crore)	Percentage of generic loan with TANGEDCO
	1	2	3= (2/1)	4	5= (4/1)	6	7= (6/1)
2018-19	1,06,100.32	23,838.29	22.47	34,513.14	32.53	47,748.89	45.00
2019-20	1,16,638.85	28,417.64	24.36	37,975.16	32.56	50,246.06	43.08
2020-21	1,34,119.90	31,328.47	23.36	50,710.17	37.81	52,081.26	38.83
2021-22	1,38,916.11	32,126.4	23.13	54,496.52	39.23	52,293.17	37.64
2022-23	1,49,810.06	34,944.16	23.33	61,217.51	40.86	53,648.39	35.81

Source: TANGEDCO's records

The loan amount related to generation activities (capital expenditure for ongoing projects, RMU works for existing stations (Kodayar and Moyar), repayment of loans of existing stations, etc.) ranged between 22.47 *per cent* and 24.36 *per cent* of the total loan. The generic loan i.e. non-capex loan (non-distinguishable between Generation and Distribution) ranged between 35.81 *per cent* and 45 *per cent* which resulted in reduction of capital investment and increase in revenue expenditure towards day-to-day expenses. This is evident from the high finance cost incurred for the past five year period (Table No.10) because of non-commissioning of the planned projects.

3.2.1 Review of outstanding debt of TANGEDCO -Generation loan

The loan amount of ₹34,944.16 crore was obtained for generation activities of ongoing capital-intensive projects (five thermal and two hydro) as well as existing power stations and RMU works of hydro power stations. The interest rates ranged from 10.34 *per cent* (Kollimalai Hydro Project) to 14 *per cent* per annum (MTPS-II) and TANGEDCO paid interest amount of ₹15,574.10 crore during the review period 2018-19 to 2022-23 (Annexure-2).

Out of the total outstanding Generation loan of ₹34,944.16 crore, the amount related to on-going projects (₹26,630.27 crore including ₹4,635.69 crore related to Uppur Project which was repaid in January 2024) was 76.21 *per cent* and, for the existing station including RMU and other works (₹8,313.89 crore) is 23.79 *per cent* as of March 2023.

The seven power projects under execution (five thermal and two hydro) are yet to be commissioned and the percentage of completion ranged between 18 *per cent*⁴ and 94 *per cent*⁵ (March 2023). As per the DPR, the total project cost including interest during construction (IDC) was ₹53,163.73 crore. As per DPR, TANGEDCO's contribution would be ₹10,632.75 crore towards 20 *per cent* share of equity contribution and ₹42,530.98 crore (80 *per cent* of total project cost including IDC) would be external borrowings from the

³ Loans taken for non-capex purposes (working capital requirements and other general purposes)

⁴ ETPS Expansion

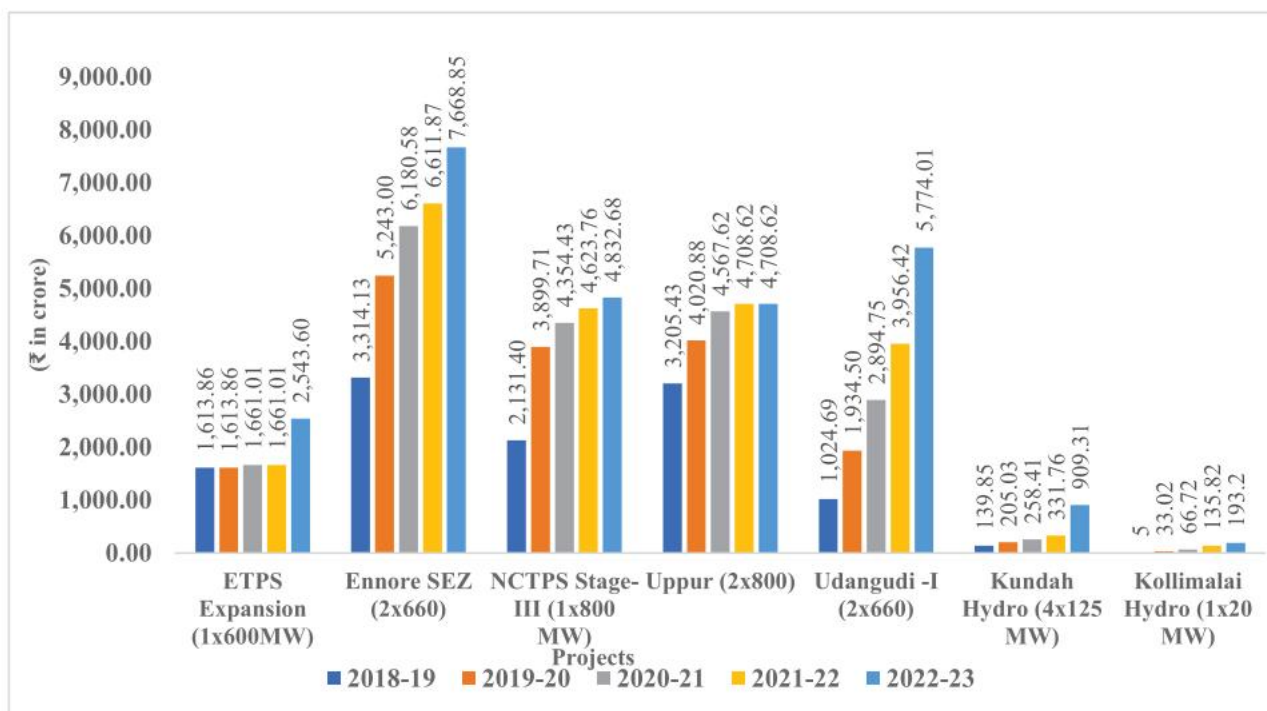
⁵ NCTPS-III

finance corporations. There was no contribution from GoTN for these projects.

TANGEDCO had actually availed loan of ₹26,646.52 crore from the finance corporations for the new projects. It had paid (March 2023) ₹10,107.40 crore towards interest (37.93 per cent of availed loan) even before commissioning of the new projects. In this regard, it was also seen that the above loan included amount of ₹47.16 crore (2020-21) and ₹882.59 crore (2022-23) towards ETPS Expansion project even though there was no progress of work for the past five-year period. Also, an amount of ₹1,642.71 crore was paid (March 2023) towards interest for the project. This will increase the project cost as well as levelised tariff which ultimately will affect the MOD. Similarly, an amount of ₹2,102.08 crore has been paid towards interest till date for the Uppur project which is standstill from 2021 onwards.

The outstanding debt of all the seven projects are exhibited in nutshell in the **Chart 4** below:

Chart 4: Outstanding debt of on-going projects (₹ in crore)



Source: Annual Accounts/Details provided by TANGEDCO (2019-20 to 2022-23)

The slow progress of other projects and consequent interest payments affected the financials of TANGEDCO. The excess IDC incurred to the extent of ₹3,611.97 crore in respect of three thermal projects (NCTPS-III, Ennore SEZ and ETPS Expansion) and the possibility of disallowance to TANGEDCO has been dealt with in Chapter-4.

The Government replied (January 2025) that multiyear tariff has been filed and TANGEDCO has been restructured into three entities. Hence, the interest quantum would decrease in subsequent years. The reply of the Government is not acceptable since the projects are delayed much beyond the scheduled target date of completion and are still under execution with

tardy progress. Consequently, TANGEDCO cannot avoid the heavy interest commitment in the subsequent period also.

3.3 Benchmark Cost/Levelised Tariff

i) **Benchmark capital cost** represent the standard cost of a project and Central Electricity Regulatory Commission (CERC) determined (June 2012) the benchmark norm for capital cost of thermal power stations at the price level of December 2011. Benchmark capital cost is dynamic and based on market trends, indices and is subjected to adjustment based on inflation. Accordingly, Audit worked out the per MW cost for the new five thermal power stations being executed considering the CPI inflation rate of six *per cent* as per TNERC order and compared with the benchmark cost fixed by CERC as detailed in **Table 13** below:

Table 13: Bench mark fixed by CERC and actual expenditure

Project	Capacity (MW)	Actual Cost per MW (₹ crore)	Benchmark cost per MW (₹ crore)	Cost per MW after six <i>per cent</i> escalation (₹ crore)	Difference (₹ crore)	Excess cost per MW (₹ crore)
1	2	3	4	5	6=3-5	7=6*2
NCTPS-III STPP	800	7.97	4.63	5.84	2.13	1,704
Udangudi STPP	1,320	9.91	5.01	6.70	3.21	4,237
Ennore SEZ STPP	1,320	7.60	5.01	5.63	1.97	2,600
ETPS Expansion STPP	660	9.67	5.37	8.07	1.60	1,056
Uppur STPP	1,600	7.98	4.79	6.05	1.93	3,088
Total	5,700					12,685

Source: Details provided by TANGEDCO

The difference of per MW cost ranged between ₹1.60 crore and ₹3.21 crore which resulted in excess capital cost to the extent of ₹12,685 crore. This may end up with (i) higher levelised tariff with consequent non-qualification in Merit Order Despatch (MOD)⁶, (ii) elongation of payback period, (iii) possibility of disallowance of IDC (as was done in MTPS-II and NCTPS-II power stations) and other expenses, etc.

The Government replied (January 2025) that the bench mark cost set in December 2011 did not include the cost escalation up to February 2021. It was also added that the weighted average project cost in respect of other States was higher than TANGEDCO's cost. The reply of the Government is not acceptable as the escalation inflation rate of six *per cent* has been fixed by TNERC and Audit considered this rate only for comparison.

ii) Levelised Tariff represents the average revenue per unit of electricity generated that would be required to recover the costs of building and operating a generating plant during an assumed financial life. Higher levelized tariff will severely impact the revenues of the project and make it financially and economically unviable.

⁶ MOD is a way of ranking available sources of energy based on ascending order of price (Marginal/Variable cost of production) for the purpose of meeting the demand.

As per the DPR, the levelised tariff of the ongoing projects was ranging from ₹4.42 per unit to ₹5.43 per unit. Audit noticed that the latest commissioned two thermal power plants viz., MTPS-II (October 2013) and NCTPS-II (May 2014) have been ranked as 16 and 31 (out of 37) respectively in MOD because of their variable costs of ₹2.30 per unit and ₹3.06 per unit respectively. Hence, the probability of ranking the new thermal power projects under execution in the MOD is remote which will lead to under-recovery of fixed cost and further result in extending the payback period. Consequently, the power stations could not recoup their fixed cost on account of high reserved outages (shut down of plant as per the direction of SLDC) based on higher MOD ranking.

3.4 Deficiencies in obtaining loans for operational requirements

Audit analysed the loan amount availed by TANGEDCO for the two selected thermal power stations which revealed the following:

- NCTPS-II project (Unit-I) was awarded (January 2008) to BHEL on EPC cum Finance basis for ₹2,475 crore. As per the LOA and financial bid conditions, BHEL has to arrange the finance at 11 *per cent* (fixed) for execution of the project till declaration of COD (45 months). However, BHEL conveyed their inability to finance the project and hence, they made financial tie-up with REC with execution of tripartite agreement⁷ (August 2008) to fund this project at 12.25 *per cent*. BHEL had agreed to reimburse the incremental interest cost of ₹91.15 crore and TANGEDCO addressed BHEL (November 2014/May 2015) to reimburse the amount. However, the amount is yet to be received (March 2024) by it and is leading to loss of interest for TANGEDCO.
- TANGEDCO availed (August 2008) ₹5,938 crore (₹2,713 crore for Unit-I and ₹3,224.82 crore for Unit-II) towards establishing NCTPS-II units from REC. In this connection, the loan policy circulars issued (August 2009) by Rural Electrification Corporation (REC) offered a volume discount of 0.25 *per cent* on applicable interest rates when the loan disbursements exceed ₹1,000 crore. The project loans in respect of NCTPS-II (Unit-I and Unit II) fulfilled this criterion in September 2010 and April 2011 respectively. Such rebate condition prevailed till October 2013 and TANGEDCO failed to avail the discount. Hence, TANGEDCO has to pay interest at higher rates till the end of loan period which worked out to ₹98.33 crore (Unit I-₹49.90 crore & Unit II-₹48.43 crore) till March 2023.

The Government replied (January 2025) that REC has provided volume discount for the loan amount disbursed for transmission and distribution scheme loans only and not for projects. It was also added that the volume discount has been dropped from December 2019 even for transmission and distribution scheme loans. The reply is not tenable as volume discount was extended to TANGEDCO and there was no bar in availing the loan for projects. Further, the loan was availed during August 2008 itself and the volume discount provision was existing during the availment of loan period.

⁷ Agreement executed by TANGEDCO with REC and BHEL

- TANGEDCO availed (March 2008 to February 2014) a loan of ₹3,903.39 crore from Power Finance Corporation (PFC) for executing MTPS-II project. As per the terms and conditions, TANGEDCO had to submit its audited annual accounts within the prescribed time, make tie-up for availability of beneficiated coal, file the ARR annually, etc., for classification under 'A' category which was advantageous when compared to other categories in terms of interest rates. However, due to non-fulfilling the terms, MTPS-II was classified (June 2009) under 'B' category and was charged 0.25 *per cent* higher. This has resulted in payment of higher interest till the term of loan and the excess interest charged was ₹22.23 crore (**Annexure-3**) during the review period. TANGEDCO did not take any effort to convert the loan from category 'B' to 'A' for its financial advantage.

The Government replied (January 2025) that the rating scores were awarded based on various parameters like tariff revision, smart metering, etc. Further, it accepted that since adequate tariff revision was not made for a longer period, expected scores could not be achieved and hence, 'B' category was assigned to TANGEDCO. However, the fact remains that TANGEDCO failed to fulfil the conditions stipulated in the agreement and hence, it was categorised under 'B' category thereby losing the opportunity to save the additional interest burden.

- REC sanctioned (July 2018) ₹4,000 crore at 10.50 *per cent* per annum with a tenure of 10 years. TANGEDCO obtained the amount in four instalments of ₹1,000 crore each (July to September 2018). In this connection, Audit observed that TANGEDCO had requested the Government (June 2018) to provide guarantee for principal and interest whereas REC, in its sanction letter demanded Government Guarantee for 100 *per cent* loan amount only. Based on TANGEDCO's request, Government provided (October 2018) the guarantee for principal and interest and TANGEDCO was forced to pay guarantee fee (0.5 *per cent*) for ₹6,645.80 crore (₹4,000 crore loan plus interest ₹2,645.80 crore) instead of paying for principal alone. This has resulted in avoidable payment of guarantee fees of ₹92.60 crore (March 2023) on the interest amount of ₹2,645.80 crore.

The additional payment of interest towards guarantee fee would increase the accumulated loss of TANGEDCO.

3.5 Avoidable excess payment of transmission charges

The power generated at Power Stations of TANGEDCO is stepped up and fed into the transmission lines maintained by TANTRANSCO for which TANGEDCO pays monthly transmission charges (fixed by TNERC through tariff orders⁸) based on installed capacity, irrespective of whether the power plants generate power or not. Audit observed avoidable payment of transmission charges to the tune of ₹346.68 crore as discussed below:

⁸ ₹3,037.30 per MW (2018-19 to 2021-22) and ₹5,159.26 per MW (2022-23)

Thermal/Gas power stations

The norm fixed for PLF by TNERC, actual PLF achieved and resultant excess payment of transmission charges in respect of selected power stations are given in **Table 14** below:

Table 14: Avoidable payment of transmission charges

Power Station	PLF fixed by TNERC (per cent)	Actual PLF achieved (per cent)	Avoidable transmission charges paid (₹ in crore)
MTPS-II	80	26.99 to 59.99	108.42
NCTPS-II	80	34.76 to 63.85	218.01
KGTPS	70	15.08 to 62.04	14.95
VGTPS-I	70	57.48 to 87.33	1.40
Total			342.78

Source: Details provided by TANGEDCO

Both the thermal power stations have not achieved the PLF fixed by TNERC (80 per cent) throughout the audit period. Further, M/s. Gas Authority of India Limited (GAIL) was supplying only 50 to 70 per cent of the contracted quantity of natural gas to the gas turbine power stations and hence, TNERC has fixed the normative PLF at 70 per cent of installed capacity.

All the above power stations could not achieve the desired PLF due to outages and hence, forced to pay avoidable transmission charges to the extent of ₹342.78 crore for the period 2018-23.

The Government replied (January 2025) that the gas turbine power stations could not achieve PLF fixed by TNERC due to short supply of gas than the committed quantity. However, Audit observed that due to absence of specific clause for penalising the gas supplier for short supply of gas in the agreement, GAIL had made it routine to supply gas below the agreed quantum which consequently resulted in excess payment of transmission charges. In this connection, TANGEDCO also failed to incorporate suitable clause to levy penalty for short supply of gas in its agreement with GAIL (as explained in Chapter-5).

Wind Energy Generation

Out of the total 110 WEGs (17.47 MW), only 21 WEGs (4.4 MW) were in generating condition and the remaining 89 WEGs stopped functioning during various period from 1993. Out of the 89 WEGs, 18⁹ WEGs (3.275 MW) were condemned and the remaining 71 WEGs (9.79 MW) remained non-operational (November 2023). Hence, the installed capacity, after removal of the condemned (3.275 MW) and non-functional (9.79 MW) would effectively be 4.4 MW only.

Audit observed that transmission charges were paid for the entire installed capacity of 17.47 MW (instead of 4.4 MW), thereby resulting in excess payment of ₹3.90 crore during 2018-23.

⁹ Kethanur-8 (2017), Kayathar-9 (2020) and Mullakadu-1 (2020)

3.6 Failure to avail benefits under Clean Development Mechanism

Clean Development Mechanism (CDM) is a flexible mechanism which allows projects to earn carbon credits. The amount of carbon emission saved¹⁰ by each project is required to be certified by National Clean Development Mechanism Authority (NCDMA). The certificate (tradable carbon credits) specifying carbon reduction can be sold to developed countries which are signatories to the protocol. The intention to seek CDM benefits should be notified to the NCDMA within six months of the project start date for obtaining approval. TANGEDCO failed to notify its intention of availing the benefits for its seven ongoing projects within the specified time frame, thereby foregoing the benefits under CDM to the tune of ₹407.66 crore¹¹ per annum.

As TANGEDCO failed to obtain the approval by intimating to NCDMA within six months of project start date, it lost the opportunity to trade the CERs at a later date also.

The Government replied (January 2025) that action was being taken to obtain CDM benefits in respect of NCTPS-III and Ennore SEZ. It was also stated that the CDM benefits would be obtained for ETPS Expansion and Uppur projects after awarding of contracts.

3.7 Non recoupment of Regulatory Asset as per TNERC order

Regulatory asset represents the cost incurred by the DISCOMS that are in the nature of deferred expenditure and are recoverable from customers in future through regulated rates or tariffs. The cost is recorded on the DISCOM's balance sheet as an asset. As per Clause 13 of TNERC (Terms and Conditions for Determination of Tariff) Regulations 2005, (1) wherever the licensee (TANGEDCO) could not fully recover the reasonably incurred cost at the tariff allowed with its best effort after achieving the benchmark standards for the reasons beyond its control under natural calamities and force majeure conditions and consequently there was a revenue shortfall and if TNERC is satisfied with such conditions, it shall treat such revenue shortfall as Regulatory Asset and (2) the same shall first be adjusted against the contingency reserve and the balance, if any, will be allowed to be recovered within a period of three years as decided by TNERC. The regulatory framework also allows TANGEDCO to treat certain unrecovered expenses as regulatory assets, permitting them to recover these costs over time rather than bearing them all at once.

The Commission has computed the cumulative Revenue Gap¹² till FY 2021-22, with carrying cost¹³ (as detailed in the following table) and has endeavoured (September 2022) not to create any new regulatory asset from

¹⁰ One Ton of carbon dioxide reduced through CDM is equivalent to one Certified Emission Reduction (CER)

¹¹ NCTPS-III - ₹87.49 crore, Udangudi - ₹144.36 crore, Ennore SEZ - ₹144.36 crore; KPSHEP - ₹26.45 crore, KHEP - ₹5.00 crore (excluding ETPS Expansion and Uppur Projects)

¹² Revenue gap is the difference between the total revenue requirement and the sum of tariff/non-tariff revenue, other income and government subsidy.

¹³ Carrying cost is provided by TNERC for the delayed recoveries of Regulatory Asset, which will be equivalent to bank rate plus 0.10 *per cent*.

FY 2022-23 onwards since GoTN has agreed (August 2021) to take-over 100 per cent financial losses of TANGEDCO from FY 2021-22 onwards under Liquidity Infusion Scheme. Therefore, need for passing on the revenue deficit to consumers has not arisen as detailed in **Table 15** below:

Table 15: Cumulative Regulatory Asset

Description	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22
Opening Balance	10,433	12,420	22,131	36,429	52,844	72,002
Addition of Revenue Gap/(Surplus)	898	8,406	12,579	15,580	18,971	18,106
Amount Received from Government of Tamil Nadu towards funding loss	-	217	776	3,156	5,217	7,108
Closing Balance	11,330	20,609	33,934	48,853	66,597	83,000
Average Balance	10,882	16,515	28,033	42,641	59,721	77,501
Interest Rate (percentage)	10.01	9.22	8.90	9.36	9.05	9.69
Carrying Cost	1089	1523	2495	3991	5405	7510
Closing Balance	12,420	22,131	36,429	52,844	72,002	90,510
To be adjusted against the amount received during 2022-23	-	-	-	-	-	10,998
Net Closing Balance	12,420	22,131	36,429	52,844	72,002	79,512

Source: TNERC Order dated 28 March 2024

TANGEDCO's overall regulatory asset scenario till FY 2021-22 inclusive of carrying cost was ₹79,512 crore. TANGEDCO has not initiated any roadmap and strategy till date (March 2024) for amortization/liquidation of regulatory assets created upto this period. It was further seen that in its order dated (August 2024), TNERC has directed TANGEDCO to seek approval of GoTN to get the cumulative revenue gap to be liquidated through available Government resources.

The Government replied (January 2025) that the newly formed Tamil Nadu Green Energy Corporation Limited (TNGECL) is a profit-making company and the losses will be amortised periodically. It was also stated that at the time of amortisation, a road map will be finalised. The reply of the Government is not acceptable since TNGECL which was formed in April 2024 has no role over the accumulated regulatory asset created from 2013 to 2022 which should have been amortised within three years from the date of creation.

3.8 Non-filing of Tariff Petition with TNERC

As per Clause-5 of TNERC Regulations 2005, TANGEDCO (licensee) shall file the Aggregate Revenue Requirement (ARR) on or before 30th November every year in the prescribed format (two-part tariff - Variable cost and Fixed cost) for next financial year Tariff fixation with TNERC, containing the details of the expected aggregate revenue that the licensee is permitted to recover at the prevailing tariff and the estimated expenditure. Further, ARR has to be filed every year even when no application for determination of tariff is made.

Audit noticed that TANGEDCO had violated the provisions of the above Regulations by not filing the Tariff petition (ARR) and Truing-Up petitions

before TNERC in time. It was noticed that TANGEDCO has filed the Tariff Petition (ARR) for the review period 2018-19 to 2022-23 with TNERC, only once (2022-23) instead of filing every year. This has resulted in non-revision of tariff and further revenue loss to TANGEDCO during that period.

The Government replied (January 2025) that TANGEDCO had filed petition (July 2022) for fixing multi-year tariff for the control period 2022-23 to 2026-27 before TNERC and it has admitted the same and issued (September 2022) Tariff Order. The fact, however, remains that TANGEDCO did not file ARR petition during the review period up to July 2022.

3.9 Disallowance of TANGEDCO's claim by TNERC

As per Regulation 36 of TNERC (Terms and Conditions for Determination of Tariff) Regulations, 2005, the tariff for sale of power by the Generating Companies shall be of two parts namely the Fixed Charges (recovery of annual capacity charges) and Variable (energy) charges. The Commission has adopted a rationale for allowing/ disallowing various controllable components of ARR, viz., Fixed Cost and Variable Cost of generating stations. Audit observed that TNERC has disallowed TANGEDCO's claim to the extent of **₹14,324.80 crore** towards fixed and variable costs during the audit period as explained below:

3.9.1 Disallowance of fixed cost

The fixed charges consist of elements viz., Operation and Maintenance expenses, Return on Equity, Interest on Working Capital, Interest on Loan Capital and Depreciation.

The recovery of fixed charges is governed by Regulation 42 of the TNERC Regulations, 2005. As per the Regulation, full fixed/capacity charges shall be recoverable at target availability¹⁴ and recovery of capacity charges below the level of target availability would be on *pro rata* basis. Audit noticed that TNERC has disallowed a sum of **₹13,188.97 crore** as against TANGEDCO's claim of ₹43,818.08 crore as detailed in **Table 16** below:

Table 16: Details of Fixed Charges claimed and disallowed
(₹ in crore)

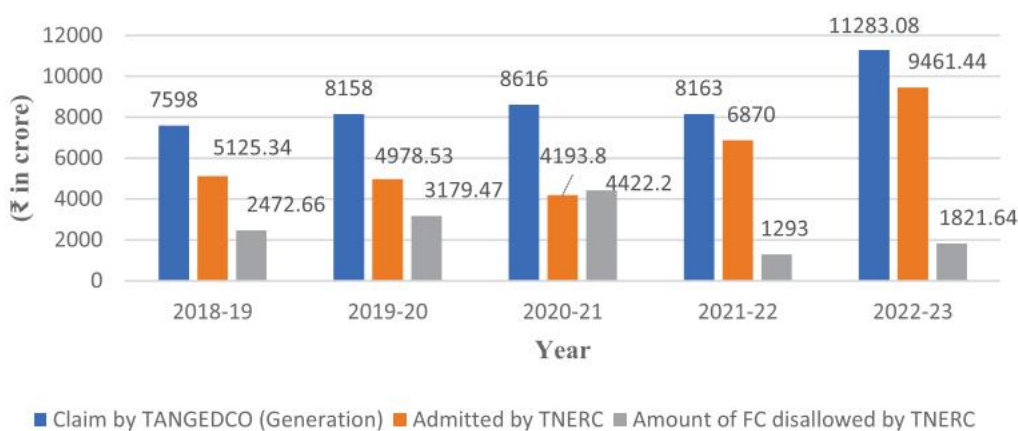
Year	Claim by TANGEDCO (Generation)	Admitted by TNERC	Amount of FC disallowed
2018-19	7598.00	5125.34	2472.66
2019-20	8158.00	4978.53	3179.47
2020-21	8616.00	4193.80	4422.20
2021-22	8163.00	6870.00	1293.00
2022-23	11283.08	9461.44	1821.64
Total	43,818.08	30,629.11	13,188.97

Source: TNERC Tariff Order No.7 of 2022 dated: 09-09-2022, Tariff Order dated 28.03.2024

¹⁴ Target Availability, as defined under Regulation 42 of the TNERC Tariff Regulations, 2005, refers to the minimum percentage of availability of a power generating station for which the full Fixed/Capacity Charges are recoverable.

The Fixed Cost claimed by TANGEDCO, allowed by TNERC and disallowed is depicted in the **Chart 5** below:

Chart 5: Disallowance of Fixed Cost by TNERC



Source: Details provided by TANGEDCO

The disallowance was mainly attributed to three parameters, viz., Operation and Maintenance (O&M) expenses, Return on Equity, and Interest on Working Capital, which are discussed below:

- O & M Expenses**

As per TNERC Regulations, 2005, only the increase in costs due to inflation is required to be passed through in tariff. Accordingly, employee expenses except DA have been escalated at 5.72 *per cent* to arrive at employee expenses of each year and over and above the norms were disallowed. Similarly, TNERC considered the Repair and Maintenance (R&M) and Administrative and General (A&G) expenses at 5.72 *per cent* on year-on-year basis and disallowed the expenses over and above the norms¹⁵ i.e beyond 5.72 *per cent*. Since the actual expenditure was 12.80 *per cent*, TNERC disallowed ₹1,101 crore during the past five years ending 2022-23 towards O&M expenses (as against the claim of ₹8,599 crore, TNERC allowed only ₹7,498 crore).

- Return on Equity**

TANGEDCO is entitled for ROE at 14 *per cent* per annum on the amount of equity invested every year to carry out future capacity additions. TNERC has disallowed the claim of equity based on the view (Suo-Motu Order No.9 of 2014) that equity has been diverted towards revenue account and hence, the addition in equity base was on account of funding revenue expenditure and not for creation of capital assets. The TNERC continued to take the same stand and not allowing any ROE thereafter also. When this was challenged, the Hon'ble APTEL upheld the Suo-Motu Order on its entirety and the Order of the Commission was not further appealed before any higher authority.

¹⁵ Actual disallowed was 12.80% (₹1,101 crore/₹8,599 crore)*100).

Hence, TNERC has adopted the same approach in the true-up¹⁶ for the subsequent years also.

Due to mixing up of funds¹⁷ by TANGEDCO, the entire amount claimed towards ROE (₹2,629.33 crore) was disallowed by TNERC. In this connection, Audit observed that despite knowing that TNERC will be disallowing the ROE due to mixing of funds, TANGEDCO is continuing the same practice and losing the opportunity of claiming ROE through tariff.

The Government replied (January 2025) that it had filed (2023) an appeal before APTEL (which is yet to be listed for hearing) in this regard. The reply of the Government is to be viewed on the fact that for the previous similar appeals, APTEL has upheld TNERC's view¹⁸ for full disallowance of RoE.

- **Interest on Working Capital**

TANGEDCO is eligible to claim its normative Interest on Working Capital (IoWC) through tariff, as specified in the TNERC Regulations, 2005. While allowing IoWC of TANGEDCO, the TNERC has considered the interest rate of Prime Lending Rate (PLR) of State Bank of India (SBI) as on April 1st of the respective years. As the lending rate of TANGEDCO was higher than the PLR of SBI, TNERC has disallowed ₹479.63 crore for the period from 2018-19 to 2022-23.

3.9.2 Disallowance of variable cost

TANGEDCO has submitted to the Commission the actual performance parameters of generation functions viz., Plant Availability Factor (PAF), Plant Load Factor (PLF), Station Heat Rate (SHR), specific oil consumption, etc., achieved to derive variable cost for its own generation. It also submitted various justifications for the deviations (ageing, design/operational constraints, etc.) between the actual operating parameters and the operating parameters approved by TNERC.

The Commission has approved the actual PLF values submitted by TANGEDCO, after adjusting for SHR relaxation (considering vintage and backing down) and allowed an amount of ₹38,830.66 crore as against the claim of ₹39,966.49 crore, leaving a balance of **₹1,135.83 crore** as detailed in the following **Table 17** below:

¹⁶ A True-Up Order refers to the process of reconciling the actual costs and revenues with the one approved by TNERC in the earlier tariff orders. This process ensures that any variations between the estimated figures and actual figures are accounted for, and appropriate adjustments are made to the financials in subsequent tariff orders.

¹⁷ Generic loans have been taken for non-capex purposes like working capital requirements and general purposes.

¹⁸ APTEL order dated 02.03.2016.

**Table 17: Details of Variable Cost claimed and disallowed
(₹ in crore)**

Year	TANGEDCO's Claim of VC (Generation)	Amount of VC allowed by TNERC	Amount of VC disallowed
2018-19	9,047.66	8,811.94	235.72
2019-20	8,081.01	7,934.15	146.86
2020-21	5,171.51	5,067.09	104.42
2021-22	7,252.00	6,969.00	283.00
2022-23	10,414.30	10,048.48	365.83
Total	39,966.49	38,830.66	1,135.83

Source: Details provided by TANGEDCO

Despite given relaxation by TNERC, the deviation in parameters was higher when compared with the norm resulting in under recovery of variable cost to that extent.

Thus, TANGEDCO could not recover ₹14,324.80 crore (₹ 13,188.97 crore and ₹ 1,135.83 crore towards fixed and variable cost) through tariff due to TANGEDCO's inefficient manner of handling financial parameters.

3.10 Loss funding by GoTN

As per the MoU of Ujwal DISCOM Assurance Yojana (UDAY) 2017, GoTN consented to take over the losses of TANGEDCO as detailed in **Table 18** below:

Table 18: Details of Loss funding of TANGEDCO by GoTN

Year	Loss as per Accounts (₹ crore)	Loss funding by GoTN (per cent)	Amount of Grant (₹ crore)	Reference Government Orders
2016-17	4,348.76	5	217.43	No.25 dated 23.03.2018
2017-18	7,760.77	10	776.08	No.68 dated 13.09.2019
2018-19	12,623.41	25	3,155.85	No.14 dated 22.03.2021
2019-20	11,964.93	50	5,982.47	No.14 dated 22.03.2021
2020-21	13,407.31	50	6,703.66	No.06 dated 09.02.2022
2021-22	11,954.64	100	11,954.64	No.40 dated 20.06.2022, No.50 dated 09.09.2022, No.58 dated 27.10.2022
2022-23	22,822.90	75	17,117.18	No.50 dated 12.07.2023 (₹1500 crore), No.05 dated 22.01.2024 (₹15,617.18 crore)

Source: Details extracted from TNERC Tariff Orders and Government Orders.

Even though the Government has agreed initially to take over 100 per cent of losses from the financial year 2021-22 onwards, only 75 per cent of the adjusted operational loss of 2022-23 was taken over by GoTN based on GOI directions (August 2023). Thus, there was a gap in loss funding to the extent of ₹5,705.72 crore during 2022-23. As per the GOI directions, 90 per cent of the loss would be taken over by the Government during 2024-25. Despite the losses were taken over by Government, TANGEDCO's operational loss is still in the increasing trend on account of inefficiencies in maintaining the existing power stations and utilizing them at their optimum capacities and abnormal delays in implementing the new power projects (being dealt in under Chapter-4 and Chapter-5).

The Government replied (January 2025) that as against the loss of ₹10,868.26 crore, the GoTN has released ₹17,117.18 crore and hence, there was no gap for loss funding. The reply is incorrect since out of ₹22,822.90 crore of loss reported in 2022-23, Government took over only ₹17,117.18 crore thus leaving a balance of ₹ 5,705.72 crore representing 25 *per cent* of TANGEDCO's loss yet to be taken up.

Recommendations:

TANGEDCO should:

- 1. Analyse the causes for exceeding the benchmark cost for the project and take appropriate and timely measures to keep it within the CERC norms;**
- 2. Take up the issue of liquidation of regulatory assets with the Government within the specified time frame; and**
- 3. Clear guidelines/norms should be evolved by TANGEDCO so that no mixing up of capital & revenue accounts are done.**

Chapter – 4

CHAPTER-4

PERFORMANCE OF THERMAL POWER STATIONS AND CAPACITY ADDITIONS

TANGEDCO's power stations suffered avoidable forced outages due to non-capital overhauling and non-carrying out preventive maintenances in time.

TANGEDCO failed to claim the shortage in supply of coal from the suppliers and incurred additional expenditure. Acceptance of lower grade coal resulted in excess consumption of coal.

TANGEDCO did not regulate the payment for imported coal based on the test reports of Customs Department.

The thermal power stations discharged effluent treated water outside the plant boundary and the water so let out polluted the river and sea water.

The five thermal projects proposed to be commissioned before 2021 have not been commissioned as per schedule and are in various stages of completion.

The delay in achieving COD resulted in time and cost overrun with consequent impact on purchase of power at higher cost. Coal tie-up for ongoing projects is yet to be finalised.

TANGEDCO had established seven thermal power stations between 1953 and 2014, and one power station (Basin Bridge) was dismantled while another one (Ennore TPS) was under permanent shutdown. Out of the five existing thermal power stations (4,320 MW) commissioned between 1990 and 2014, the performance of the latest commissioned two power stations viz., MTPS-II (2013) and NCTPS-II (2014) have been selected for detailed audit. Besides, TANGEDCO is implementing five thermal power projects (5,700 MW) and all these projects have also been scrutinized. The observations on the performance of existing power stations and the discrepancies noticed in executing the new projects are discussed in the succeeding paragraphs. Further, the deficiencies observed in the coal management are also highlighted in this report.

4.1 Existing Thermal Power Stations

MTPS-II (600 MW) power station was established (October 2013) adjacent to the existing MTPS-I power stations at a cost of ₹3,550 crore. This was the first 600 MW power plant in the State. This power station receives coal supply from Talcher collieries in Odisha State through rail-sea-rail route. Also, foreign coal is being imported from Indonesia. The daily requirement of coal for generating 600 MW is 10,500 MT per day.

NCTPS-II (2x600 MW) power station was commissioned (May 2014) adjacent to the existing NCTPS-I power station at ₹4,650 crore. The requirement of coal is sourced from Talcher mines and the coal requirement per day is 21,000 MT per day.

A review of the operational performance and maintenance activities of the above selected power stations for the period from 2018-19 to 2022-23 was carried out. The audit findings show that the power stations could not achieve the desired parameters due to various controllable factors and there was scope for improvement.

4.1.1 Operational Performance of existing thermal power stations

Performance parameters in respect of power plants of TANGEDCO were analysed during the audit. Detailed analysis of generation of power, parameter wise is shown below in **Table 19**:

Table 19: Operational Performance of thermal power stations

Particulars/ Year	MTPS-II (1x600 MW)					NCTPS-II (2x600 MW)				
	2018-19	2019-20	2020-21	2021-22	2022-23	2018-19	2019-20	2020-21	2021-22	2022-23
Generation as per installed capacity (MUs)	5256	5256	5256	5256	5256	10512	10512	10512	10512	10512
Generation at 80% PLF (MUs)	4205	4205	4205	4205	4205	8410	8410	8410	8410	8410
Gross Generation (MUs)	3153	2596	1418	2764	3001	6712	5672	3653	4512	5440
Shortfall in Generation (MUs)	1052	1609	2787	1441	1204	1698	2738	4757	3898	2970
Percentage of shortage	25.01	38.26	66.28	34.27	28.63	20.19	32.55	56.56	46.35	35.31
Auxiliary Generation (MUs) ¹	218.414	182.964	102.04	209.92	230.43	427.41	389.67	306.63	383.85	437.02
Net Generation (MUs)	2934.686	2413.046	1316.33	2553.86	2770.264	6284.916	5282.25	3346.86	4128.48	5003.42
Station Heat Rate (kcal per kWh) ²	2403	2443	2441	2434	2419	2560.32	2594.9	2613.13	2520.98	2571.31

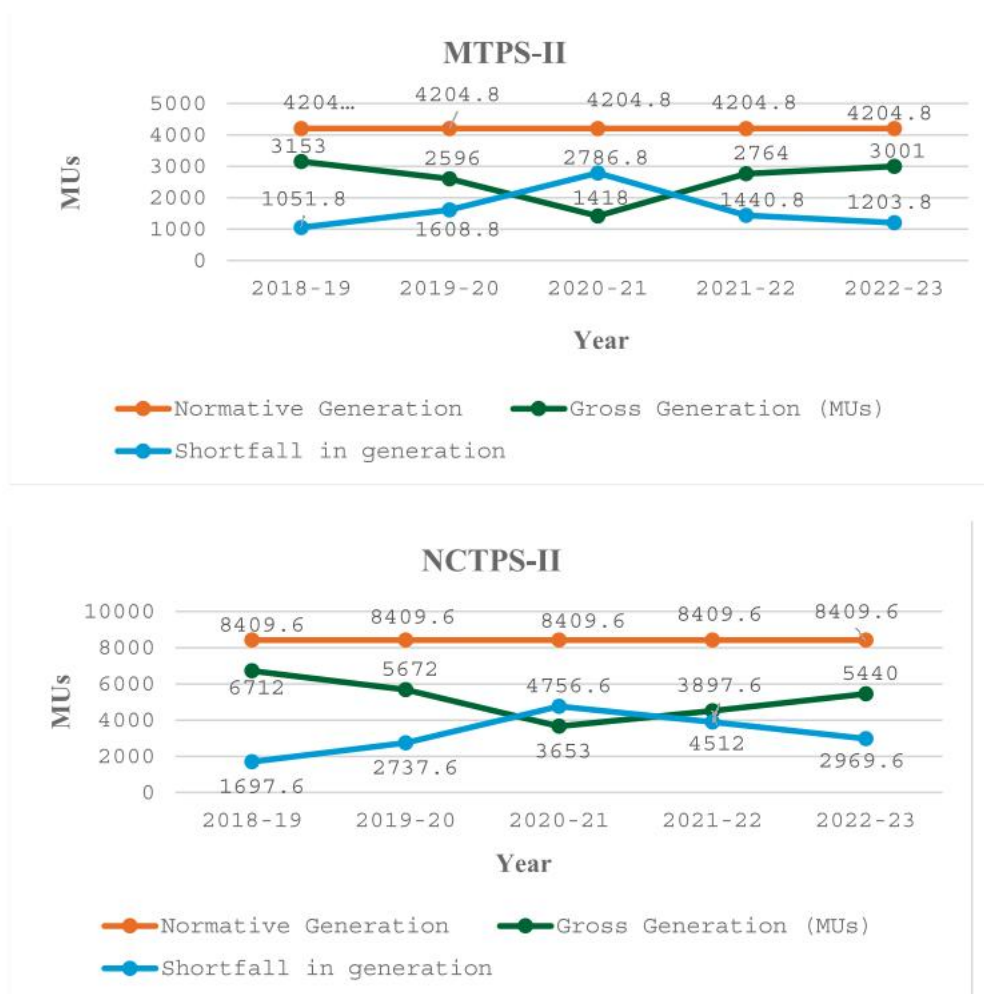
Source: Performance Review of TANGEDCO

From the above, it may be seen that there remained a shortfall ranging from 20 per cent to 66 per cent w.r.t. own generation when compared to the normative generation at 80 per cent PLF fixed by TNERC. This indicated over dependence of purchase of power rather than increase in generation. Even though the power stations showed an increasing trend of generation in the past two years (after COVID-19), they could not achieve the generation even at the normative PLF of 4,205 MUs (MTPS-II) and 8,410 MUs (NCTPS-II). Comparison of actual generation *vis-a-vis* normative generation approved by TNERC is depicted in the **Chart 6** below:

¹ TNERC Norm – 8.5 per cent.

² Plant design MTPS-II: 2,251 kcal per kWh. NTPS-II: 2,252 kcal per kWh.

Chart 6: Details showing the norm for generation and actual generation



Source: Details provided by TANGEDCO

The operation of power generating stations is dependent on input efficiency, consisting of material and manpower, and output efficiency, which relates to PLF, capacity utilization, outages, etc. These aspects have been discussed in the succeeding paragraphs.

4.1.2 Generation loss due to Low Plant Load Factor

The Plant Availability Factor (PAF)³ and Plant Load Factor (PLF)⁴ of the selected power plants are given in the **Table 20** below:

³ PAF represents the ratio of actual hours operated to maximum possible hours available during the period.
⁴ PLF represents percentage of actual generation to generating capacity of the plant.

Table 20: Details of PAF and PLF of the two power plants
(in percentage)

Year/ Parameter	2018-19	2019-20	2020-21	2021-22	2022-23
MTPS-II					
PAF	75.23	63.08	34.60	78.01	72.92
PLF	59.99	49.26	26.99	52.58	57.09
Generation Loss due to Outages (MUs)	1301.80	1945.92	3437.64	1155.62	973.61
- Forced Outages (MUs)	274.54	129.77	8.98	384.66	384.67
- Planned Outages (MUs)	443.40	462.12	325.77	432.93	438.22
-Reserved Outages (MUs)	583.86	1354.03	3102.89	338.03	150.72
NCTPS-II					
PAF	75.97	65.78	44.88	68.96	62.41
PLF	63.85	53.81	34.76	42.93	51.75
Generation Loss due to Outages (MUs)	2525.59	3607.50	5794.38	3263.44	3202.97
- Forced Outages (MUs)	813.64	791.41	1651.71	3229.75	1651.33
- Planned Outages (MUs)	873.32	909.97	1034.03	0	1015.70
-Reserved Outages (MUs)	838.63	1906.12	3108.64	33.69	535.94

Source: Statistics at a glance of TANGEDCO

PLF is commonly considered as a measure of the capacity utilisation of a power plant. A low PLF indicates that the power station is not being utilised at its optimal capacity and would increase the unit cost of the power produced. It could be seen that the PAF and consequent PLF were low during 2020-21 due to Covid-19. TNERC had fixed a norm of 80 *per cent* PLF for thermal power stations to recover 100 *per cent* fixed cost. However, the PAF of the power plants itself was less than 80 *per cent* (except MTPS-II for 2022-23) and consequent lower PLF mainly on account of higher forced outages and reserved outages.

The power stations could not achieve the desired PLF during the entire review period which varied from 27 *per cent* to 60 *per cent* (MTPS-II) and from 35 *per cent* to 64 *per cent* (NCTPS-II) due to non-capital overhauling of the Boiler, Turbine and Generator (BTG) for the last nine years since Commercial Operation Date (COD) as against the OEM norms of once in four years and consequent reduction in BTG efficiency with high outages. Non-availability of power plants owing to planned, reserved and forced outages resulted in non-achievement of normative PLF. Consequently, the power stations lost 34,025.71 MU of power impacting additional expenditure of ₹9,576.06 crore.

a) Forced outages

The Units suffered avoidable forced outages to the extent of 9,320.46 MUs of power during the period from 2018-19 to 2022-23. The percentage of forced outages varied between 0.17 *per cent* and 7.32 *per cent* in respect of MTPS-II and between 7.51 *per cent* and 30.72 *per cent* in respect of NCTPS-II. On scrutiny, it was noticed that the outages had occurred mainly on account of (i) Boiler tube punctures and (ii) Ash evacuation problems. Even though the failure due to boiler tube puncture is a routine phenomenon, TANGEDCO did not take any concrete efforts to contain such failures leading to forced outages. Identifying and correcting the root cause of tube failures is essential to help lessen the chance of future problems. When the

power plant is overhauled every year, a comprehensive assessment of the caustic attack areas is required to determine the root cause of the failure and take remedial action to eliminate the problem. Caustic attack normally occurs when there is excessive deposition of chemicals on tube surfaces.

The percentage of failure due to boiler tube puncture in MTPS-II⁵ was 45 *per cent* (amounting to 527.92 MUs) and in NCTPS-II⁶, it was 30 *per cent* of total loss (amounting to 2,417.81 MUs) during the audit period. To prevent reoccurrence of caustic gouging, the stations should prevent accumulation of excessive deposits so that boiler water does not locally form caustic.

Similarly, MTPS-II and NCTPS-II lost generation to the extent of 510.32 MUs and 2,727.62 MUs respectively during the audit period due to ash evacuation problem representing 43 and 34 *per cent* of the total generated units respectively during the audit period. Further analysis revealed that there occurred (April 2021) a huge breakdown of vacuum system of fly ash in MTPS-II and hence, the ash could not be evacuated fully. The dry fly ash started to build up inside Electrostatic Precipitator (ESP) hoppers damaged their internals causing tripping of many fields of ESP. Consequently, the power plants ended up with loss of generation and the Unit had spent ₹28.29 crore (August 2021 to April 2023) for transportation of the spilled fly ash to enable continuous generation of MTPS-II.

Similarly, due to lack of regular and preventive maintenance of Ash Handling System of NCTPS-II by the O&M contractor, it collapsed in April 2021 (Unit-II) and in August 2021 (Unit-I) on account of huge ash accumulation of ash in the ESP hopper. As a result, TANGEDCO had to incur ₹131.58 crore towards restoration of AHS (Erection and Revamping works) along with installation of pressurized dense fly ash conveying system (PDFAC) for evacuation of dry fly ash.

The Government replied (January 2025) that action has been taken to mitigate the ash conveying problems. It was also stated that the first phase for conveying ash through pipeline from hoppers was completed (October 2024) and the remaining work is in progress for MTPS-II. It was further stated that action would be taken to avoid loss of generation due to ash issues. The fact, however, remains that the efficiency of the plants was compromised by way of not taking corrective actions at the appropriate time. Further, the remedial measures planned in MTPS-II is yet to be completed (March 2024) whereas the PDFAC system has been installed only in NCTPS-II.

Audit in this regard observed that, had all the units been run without forced outages, additional 9,320.46 MUs of power could have been generated by both the power stations. To meet out the loss of energy, TANGEDCO had purchased power from private generators at a higher cost thus resulting in avoidable additional expenditure of ₹2,730.31 crore⁷ (**Annexure-4**).

5 Total – 10 Nos.

6 Total – 48 Nos.

7 Worked out by comparing the variable cost of the power stations with the average power purchase cost during the respective years.

b) Reserved outages

To maintain the stability of grid, the State Load Despatch Centre (SLDC) directs the power plants to shut down (Reserved Shutdown) and the power generating units will be kept in standby mode without generation. Because of this, the Units could not generate power to the extent of 11,952.55 MUs during the review period.

By keeping TANGEDCO's own generating stations under shut down, it had purchased power at higher rate from various sources to that extent and incurred additional expenditure to the tune of ₹3,237.68 crore (**Annexure-5**) on account of non-availability of own power during the period of reserved shut down.

c) Running the Unit at partial load

Out of the differential loss of 39,919 MUs (difference between possible generation and actual generation, as per Table-19), the loss on account of running the plant at partial load (non-maintaining the base load) amounts to 12,752.70 MUs as shown in the **Table 21** below:

Table 21: Details showing the partial outage loss to power stations

Power Station/ Year	2018-19	2019-20	2020-21	2021-22	2022-23	Total
MTPS-II (MUs)	801.10	728.89	400.00	1336.60	1281.71	4548.30
NCTPS-II (MUs)	1274.09	1261.37	1064.13	2736.23	1868.60	8204.42
Total	2075.19	1990.26	1464.13	4072.83	3150.31	12752.72

Source: Details provided by TANGEDCO

The above loss was due to ID Fan⁸ issues (Boiler), ash handling problems, poor quality of coal, etc. Consequently, TANGEDCO had to purchase power at higher cost and the additional expenditure incurred on this account worked out to ₹3,608.07 crore (**Annexure-6**) during the same period.

4.1.3 Avoidable start-up expenditure on account of excess trippings.

The Units suffered generation loss on account of trippings ranging from seven to 72 per annum as against the CERC norms of two trippings per Unit per annum. Trippings occur due to outages and the plants have to be loaded gradually to their capacities after each outage. Till it reaches a certain level, the plants have to be operated with oil support only. Hence, as a consequence of more outages, more trippings occur and end up with high expenditure on oil. This resulted in extra expenditure to the extent of ₹104.15 crore (**Annexure-7**) towards startup (with oil support) during the review period.

The Government accepted (January 2025) the observation and stated that efforts would be taken to reduce the outages. However, TANGEDCO is yet to take corrective actions in this regard and did not seem to have planned for carrying out Capital Overhaul as recommended by the OEM. Further, the impact of outages and consequent excess consumption oil would impact the tariff also by way of disallowances.

⁸ Induced draught fan (ID fan) is provided to maintain a negative pressure in the furnace.

4.1.4 Excess manpower at power stations

It is an important consideration that manpower deployed by any Thermal Power Developing agency typically constitutes three tiers i.e., Executives, Supervisors and Workmen. The CEA Norms for Manpower requirement in Thermal Power Stations is arrived at based on the following formula:

$$\text{Manpower requirement} = \text{Project Capacity (MW)} \times \text{Multiplication Factor (MF)} \times \text{Complexity Factor (CF)}$$

The Multiplication Factor has been derived from regression between the project capacities and minimum manpower requirements and Complexity Factor (CF) fixed based on the size of the project, ash management and utilization, ease of outsourcing, water management, type of combustion technology, etc.

Based on the above, the sanctioned and actual strength of the staffs at the two selected thermal power stations (MTPS-II and NCTPS-II) have been analysed by Audit for the period from 2018-19 to 2022-23 and noticed that the power stations were excess staffed as shown in the **Annexure-8 (a) and (b)**.

The actual excess staff strength when compared to the above norm in respect of executive cadre ranged from 212 *per cent* to 277 *per cent* in case of NCTPS-II and 364 *per cent* to 380 *per cent* in case of MTPS-II power station. Similarly, in case of non-executive cadre, the excess staff ranged from 47 *per cent* to 74 *per cent* and 58 *percent* to 68 *percent* respectively for the two stations.

TANGEDCO had approved its own sanctioned strength for various power stations. However, TANGEDCO failed to devise its sanctioned strength based on CEA norms which resulted in excess employees over and above CEA Norms. This has resulted in excess expenditure towards salary for the excess staff to the extent of ₹187.74 crore (MTPS-II - ₹103.78 crore; NCTPS-II - ₹83.96 crore) during the review period.

Thus, it could be seen from the analysis of the operational performance of MTPS-II and NCTPS-II that the two plants have been facing operational glitches and operating at around 60 *per cent* of the installed capacity. As a result, TANGEDCO lost the opportunity of generating 34,025.71 MU of power and was forced to purchase power at higher cost amounting to ₹9,576.06 crore to meet its demand, thereby burdening the consumers by way of tariff.

Recommendations:

TANGEDCO should –

- 1. Take preventive measures to avoid recurrence of boiler tube punctures which contributed 30 to 45 *per cent* of outages;**
- 2. Carry out periodical maintenance of ESPs to avoid deposit of fly ash and consequent failure of Ash Handling System; and**

3. Undertake capital overhauling programme as recommended by OEM in the existing power stations to avoid outages and trippings.

4.2 Coal tie-up for existing power stations

Cost of coal is one of the vital factors in the overall expenditure of power generation. Optimisation of procurement of coal and consumption is essential to ensure cost efficiency to generate electricity at economical rates. Any inefficiency in coal procurement, transportation, handling, and contract enforcement will lead to substantial increase in cost of power.

In Thermal Power Stations, coal is used as a primary fuel and oil (Heavy Furnace Oil/High Speed Diesel) is used as a secondary fuel in boiler for generating steam. TANGEDCO's fuel requirement for existing power stations was about 260 lakh tonnes per annum. To cater this requirement, it entered in to five long term Fuel Supply Agreements (FSA) with major domestic coal suppliers (Central Coalfields Limited (CCL), Mahanadi Coalfields Limited (MCL) and Eastern Coalfields Limited (ECL)) for supply of 212.45 lakh tonnes coal (valid for 20 years) apart from one siding agreement with ECL. In addition to this, to overcome the shortage of domestic coal (if any), TANGEDCO resorted to purchase of import coal from Indonesia by awarding 13 purchase orders (though seven tenders). Further, as per the advice of Ministry of Coal (December 2019), it entered into MOU with the Singareni Collieries Company Limited (SCCL) for MTPS to supply G8 to G15 Grade⁹, through e-auction basket. The details of these agreements/MOU are exhibited in **Annexure-9**.

TANGEDCO transports coal from mines to designated load ports via railways, from load ports to discharge ports using sea routes (NCTPS and TTPS) and from NCTPS to MTPS using All Rail Route. TANGEDCO has started chartering of vessels from August 2019 onwards and issued 39 charter party agreements (under 28 tenders) by nomination basis, voyage chartering and time chartering.

The port wise details of contract are given in **Table 22** below:

Table 22: Port-wise details of coal contract

Name of the Port	Period of contract	Name of the contractor (M/s)	PO. No./date
Haldia	2018-19 (up to Feb 2019)	SIPCAL	49/20.02.2001
Visakhapattinam	2018-19 (up to Feb 2019)	SIPCAL	49 /20.02.2001
	21.8.2019 to 9/2022	Visakhapattinam Port Trust (VPT)	MOU/02.08.2019
Paradip	2018-19 to 2022-23 (July 2023)	KCT	48/15.02.2001
Gangavaram	From October 2022	Adani Gangavaram Port	143 /07.09.2022

Source: Purchase Orders/MOU

The coal handling contracts for the above load ports were awarded through POs/MOU.

Audit reviewed all the purchase orders issued for import of coal, FSA for indigenous coal and charter party fixtures. Further, all the coal handling

⁹ GCV ranging between 4,601 and 3,100 Kcal/kg.

contracts were also scrutinised. The deficiencies in procurement and movement of coal observed by Audit are discussed in the succeeding paragraphs.

4.2.1 Failure to claim shortage in supply of coal from mines to power stations resulted in extra expenditure on procurement of coal at higher cost

The FSA with the coal companies provided (clause 3.6) that if the quantity of coal delivered by the supplier (Level of Delivery), or the quantity of coal lifted by the purchaser (Level of Lifting) during any year fell below the ACQ with respect to that year, the defaulting party would be liable to pay compensation to the other party for such shortfall in Level of Delivery or Level of Lifting, as the case may be (failed quantity).

TANGEDCO received 652.88 Lakh MTs of coal from the coal companies as against the contracted quantity of 964.43 Lakh MTs during the past five years (2018-19 to 2022-23), resulting in a shortage of 311.55 lakh MTs.

In this connection, Audit observed the following:

- As per the FSA entered with coal companies, TANGEDCO is eligible for claiming compensation for short supplies, if any, based on the level of delivery (clause 3.6 – Compensation for short delivery). Despite this, TANGEDCO failed to invoke the clause and no shortage claim was lodged against the suppliers even though the shortages ranged between 19 *per cent* and 66 *per cent* during the audit period. In this connection, it is to be mentioned that even though TANGEDCO had requested (2018-19 to 2023-24) the Railways to furnish/confirm the rakes supplied, no reply has been received for taking further action (March 2024).
- On account of short supply of coal, as per the advice of Ministry of coal, TANGEDCO procured 45.83 lakh MT of coal (2020-21 to 2022-23) at higher cost based on the MOU with SCCL by incurring ₹1,435.88 crore which resulted in additional expenditure of ₹718.52 crore¹⁰.
- To meet the further shortfall in supply of indigenous coal, TANGEDCO also resorted to import coal at higher cost ranging between ₹4,605 and ₹11,945.75 per ton as against the cost of indigenous coal which was in the range between ₹1,881 and ₹2,591 per ton. Consequently, TANGEDCO had to incur extra expenditure to the tune of ₹3,222.37 crore.

Thus, due to failure to claim the shortage of coal from the suppliers, TANGEDCO incurred additional expenditure to the tune of ₹3,940.89 crore.

The Government replied (January 2025) that it had requested CIL to stop supply of coal from coal mines due to Government restrictions imposed due to Covid-19 pandemic and hence, compensation could not be claimed during that period. It also added that, for the remaining period, compensation is

¹⁰ Arrived at based on the difference between the per ton cost of SCCL (which ranged between ₹2,399.97 and ₹3,945.87) and the landed cost of MCL (which ranged between ₹1,689.43 and ₹1,770.05)

being claimed from the coal companies based on level of delivery. Further, it was stated that there was no additional expense incurred due to procurement of coal from SCCL.

The contention of the Government is not correct since no claim was made for short supply so far despite similar issue has been pointed out in CAG's earlier Report¹¹ (March 2024). It was also seen that TANGEDCO had purchased coal at higher cost from SCCL and imported coal to meet the shortage in supply which resulted in additional expenditure.

4.2.2 Non-adoption of variable pricing in import of coal

CERC had recommended (2005) to adopt variable price method for bid evaluation and payment for import of coal. CERC notifies escalation rates for various parameters, including for imported coal, as required by Ministry of Power (MOP)¹².

During the audit period, TANGEDCO floated seven tenders¹³ and finalised 13 POs to import 95.10 lakh tons of coal on account of inadequate supply of indigenous coal (due to natural calamities (cyclone affected Odisha), poor wind energy generation, decrease in supply of power from Central Generating Stations, etc.). In response to the challenges faced, TANGEDCO took a decision (October 2018) to procure additional 1.40 lakh tons of imported coal from private firms to address the immediate supply constraints and to ensure a more stable and reliable source of coal for power generation.

However, on a review of the tender files and POs, it was seen that TANGEDCO was continuously adopting firm price method¹⁴ to import coal, instead of variable pricing¹⁵. It was also recommended¹⁶ in our earlier report to follow variable pricing method by highlighting the (i) deviation in the practice followed when compared to other PSUs (NTECL, NTPL, NTPC and other SEBs), (ii) benefits during the time of fixation of price as well as making payment to suppliers and (iii) need to carry out long term analysis of the benefits under Firm pricing vis-a-vis Variable Pricing method.

Thus, TANGEDCO's failure to switch over to the industrial practice of variable price method despite knowing its advantages has resulted in additional expenditure of ₹1,244.10 crore during the five year period 2018-23. It is pertinent to note that TANGEDCO decided to switch over to variable pricing for the import of coal in August 2023 and tender (Coal-144) was floated (November 2023) after pointed out by Audit. POs adopting variable pricing method were issued with effect from February 2024 only.

¹¹ Para No.2.7.1 of CAG's Audit Report for the year ending 31 March 2019 (Report No.2 of 2021)

¹² Notification dated 19.01.2005 (as amended from time to time)

¹³ Specification No. of Coal Wing - 54, 55, 56, 57, 58, 107, and 114

¹⁴ Firm Price is a pricing strategy where the seller sets a non-negotiable, fixed price for a product or service.

¹⁵ When the index of the originating country moves down from the tender date, there will be proportionate reduction in the contract price also which is advantageous to TANGEDCO.

¹⁶ Para No.3.10.5 of the CAG's Audit Report for the year ending 31st March 2017. (Report No. 5 of 2017)

The Government replied (January 2025) that out of 13 purchase orders, it would have spent lesser than the market price in 10 Purchase orders and slightly higher than the market price in three purchase orders if opted variable price method. It was also stated that out of 95.3 Lakh Ton of procurement of imported coal during the period 2018-23, 86 Lakh Ton was procured at a discount price in 10 purchase orders and hence, there was no excess payment.

The reply is not acceptable due to the reason that Audit independently scrutinized the orders and observed that there was excess payment in 12 out of 13 POs. Further, TANGEDCO has switched over to variable price mechanism only from November 2023 and awarded two POs after being pointed out by Audit.

4.2.3 Non-adoption of hedging by TANGEDCO

Hedging reduces the risk and protect against the losses caused by unexpected market fluctuations. It also helps to minimize potential losses, stabilize cash flows, and protect from adverse currency movements. This method involves entering contracts to buy or sell an asset at a pre-determined price and date, in future (by locking the price). For the above POs issued for import of coal, payments were made in USD through Letter of Credit. The delivery period was fixed when PO was issued and hence, TANGEDCO was aware of the probable date of payment for supply of import of coal. Having aware of the probable date of payment, TANGEDCO should have adopted the strategy of hedging to overcome the fluctuation, depreciation of INR against USD and the negative impact of price volatility. Test check of five POs revealed that TANGEDCO failed to freeze the USD rate on the date of PO by paying the forward premium and lost the opportunity to save ₹4.65 crore¹⁷.

The Government replied (January 2025) that it would initiate the cost benefit analysis of taking a forward cover and to frame a policy on hedging against the foreign exchange variations in coordination with financial wing and it will put up to Board for approval. The fact however remains that no such action is initiated till date (March 2025).

4.2.4 Transit Loss of coal

i) At Load Ports

TANGEDCO awarded two coal handling contracts (February 2001), for coal movement from mines to discharge ports viz., Kamarajar Port at Ennore and Tuticorin Port for further transportation to TPSs located at North Chennai, Mettur and Tuticorin. As per the contract, the contractor shall make good any shortage of coal between quantities loaded at the collieries as per the railway receipt and the quantity as per the Bill of Ladings. However, Audit observed that TANGEDCO failed to record the shortage of coal from the collieries to the load ports whereas, the contractors were allowed to claim the shortage cover at fixed rates for minimizing the shortages at the load ports.

¹⁷ Loss/gain calculated on the difference between USD rate on the date of placing POs and USD rate on the date of payment (after considering the forward premium to be paid to the bankers).

Out of the two orders (PO 48 and 49) placed, shortage cover was claimed by the contractor as per the contract and payment ₹12.94 crore¹⁸ was made for the period 2018-19 to 2022-23 (in respect of the PO for Paradip Port). For the PO 49 (Haldia and Vizag Ports), TANGEDCO could not finalise the compensation (March 2024).

Thus, it could be seen from the above that despite specific availability of clause regarding claiming of shortages from the contractors, TANGEDCO neither calculated the shortage of coal for the past 23 years (2001-24) nor claimed compensation from the contractors. It rather paid ₹12.94 crore during the period from 2018-19 to 2022-23 alone. It was also seen that the purchase orders were valid for six months only whereas the same were renewed for 22 years. One PO (No.49) was terminated (February 2019) and the same was not closed due to pending litigation.

The Government replied (January 2025) that the reconciliation would be done with the Railways after the completion of the contract. It added that, while finalizing of shortage of coal, the entire Railway Receipts, Coal bills, Bill of lading quantity, Missing Wagons and Unconnected wagons will be reconciled for the entire 23 years contract period.

The response is not acceptable as even though Clause 5.0 of the purchase orders stipulates modes of arriving at the shortages at Load Port on completion of contract, no reconciliation was done regarding shortages between mines and load ports.

Thus, non-reconciliation of transit loss for the past 23 years shows TANGEDCO's apathy and inaction in this regard. Further, despite pointing out this issue already in CAG's earlier Report¹⁹ and recommending to prioritize the reconciliation of transit loss as it was pending for a longer period of time, no action was taken by TANGEDCO for reconciliation.

ii) At Power Station

A norm of 1.5 *per cent* was fixed for transit and handling loss²⁰ by TANGEDCO for both Indian and Imported coal transported from NCTPS to MTPS whereas it was seen that the actual transit loss ranged between 1.71 to 2.96 *per cent*. This transit loss was more than the norm in 37 months in transportation of indigenous coal and 34 months in case of imported coal during the period from 2018-19 to 2022-23. Thus, TANGEDCO lost 49,820.57 MT of coal amounting to ₹27.53 crore. It was also seen that neither the above loss was ratified by the Board of TANGEDCO nor was recovered from the contractor.

The Government replied (January 2025) that steps have been taken for getting ratification for the above-mentioned excess transit loss compared to the norm of 1.50 *per cent* from the Competent Authority.

However, the reply is silent on the corrective action to be taken to avoid such losses in future and recovery of the same from the contractor.

¹⁸ 5,17,54,841 MT @ ₹ 2.50 per ton.

¹⁹ Para 2.10.2 of the Audit Report for the year ending 31 March 2019 (Report No.2 of 2021)

²⁰ Board Proceeding No.217 dated 27.09.2005.

4.2.5 Operation and Maintenance of Coal handling contracts

TANGEDCO executed (August 2013)²¹ a lumpsum contract with CREW for handling the required coal for the power stations for five years. The contract was extended two times (up to January 2021 for MTPS-II and May 2020 for NCTPS-II) with the existing contractor (CREW) due to non-finalisation of subsequent tender with escalation of 25 *per cent* (sixth year) and 30 *per cent* (seventh year) of the last contract price.

In this connection, Audit observed the following:

The agreements were executed for 11,000 MT per day (MTPS-II) and 22,000 MT per day (NCTPS-II) based on 100 *per cent* PLF. However, the actual PLF of MTPS-II ranged from 26.99 *per cent* to 59.99 *per cent* of and NCTPS-II from 34.76 *per cent* to 63.85 *per cent* only. Hence, TANGEDCO could have restricted the agreements to the level at normative PLF of 80 *per cent* (8,800 MT per day and 17,600 MT per day for MTPS-II and NCTPS-II respectively) at least from the date of extension of contracts (October 2018 to January 2021 and November 2018 to May 2020 respectively). Therefore, fixation of handling contract at 100 *per cent* PLF for both the stations resulted in undue benefit to the contractor and loss to TANGEDCO to the extent of ₹9.93 crore (₹6.69 crore (MTPS-II) and ₹3.24 crore (NCTPS-II)).

In the subsequent agreements also (April 2023 for MTPS-II and April 2022 for NCTPS-II) the handling contracts were fixed at 100 *per cent* PLF rather than the normative PLF which resulted in avoidable expenditure of ₹7.90 crore (₹3.40 crore for MTPS-II for the period from February 2023 to January 2024 and ₹4.50 crore for the period from April 2022 to March 2024) for NCTPS-II (up to March 2024).

Thus, despite knowing the achievement of lesser PLF by the power plants, TANGEDCO entered into lumpsum contracts considering the maximum installed capacity of the power plants and incurred loss to the extent of ₹21.16 crore.

4.2.6 Improper planning in coal handling led to additional expenditure

i) MTPS-II had paid demurrage charge of ₹6.93 crore during the period from 2018-19 to 2022-23 for detaining the railway wagon for more than the permissible free time for unloading of coal. In this connection, the agreement executed with the contractor (CREW) stipulates that in case of delay in unloading, the demurrage charges payable to the railway authorities shall be recovered from the contractors. However, TANGEDCO failed to recoup the amount paid from the contractor.

The Government replied (January 2025) that in the present contract, the demurrages which are attributable to the contractors are to be assessed by the committee formed for this purpose and will be imposed on the contractor. The fact, however, remains that action has been taken only based on Audit observation.

ii) Terminal charges of ₹29.68 per tonne was levied by VPT and Paradip Port on chargeable weight basis (as per Railway Receipt) instead of the

²¹ Supply period: August 2013 to January 2021 (MTPS-II) and August 2013 to May 2020 (NCTPS-II).

actual coal handled by them and TANGEDCO failed to insist the contractors to levy the terminal charge on actual weight basis. This resulted in avoidable payment of ₹5.97 crore (**Annexure-10**).

The Government replied (January 2025) that Railway freight and other charges paid by the contractors to Port will be reimbursed at actuals, based on documentary evidence for the quantity shipped and accordingly, the port payments raised were reimbursed. The reply is not tenable as the actual quantity handled was less than the Bill of supply in both the cases.

iii) The coal handling contractors were required to pay Wagon Haulage Charges (WHC)²² to the ports at the rate notified by the Indian Railways on "rate per wagon" basis. Even though the carrying capacity of wagon was revised by Railways from 60.50 MT to 65 MT and further to 68 MT per wagon (October 2015), WHC computed by TANGEDCO was not revised duly incorporating change in the carrying capacity of the wagons (in spite of pointed out in our earlier report²³) resulting in extra expenditure of ₹2.30 crore (**Annexure-11**). TANGEDCO failed to take up the issue of increase in wagon carrying capacity to its Board to revise the formula.

The Government accepted (January 2025) that the carrying capacity of wagons were revised by Railways from 60.50 MT to 68 MT per wagon from August 2011 onwards and TANGEDCO has not revised the Wagon Haulage Charges. However, it is silent on the action proposed to overcome the issue.

4.2.7 Quality of coal and grade slippage

TANGEDCO entered FSAs with MCL, ECL and CCL for supply of coal. The coal supplied will be tested at mines end and based on the test results, either debit or credit invoice will be raised by the coal companies. The grade slippage of coal at various points and its impact are explained below:

i) From mine to load ports

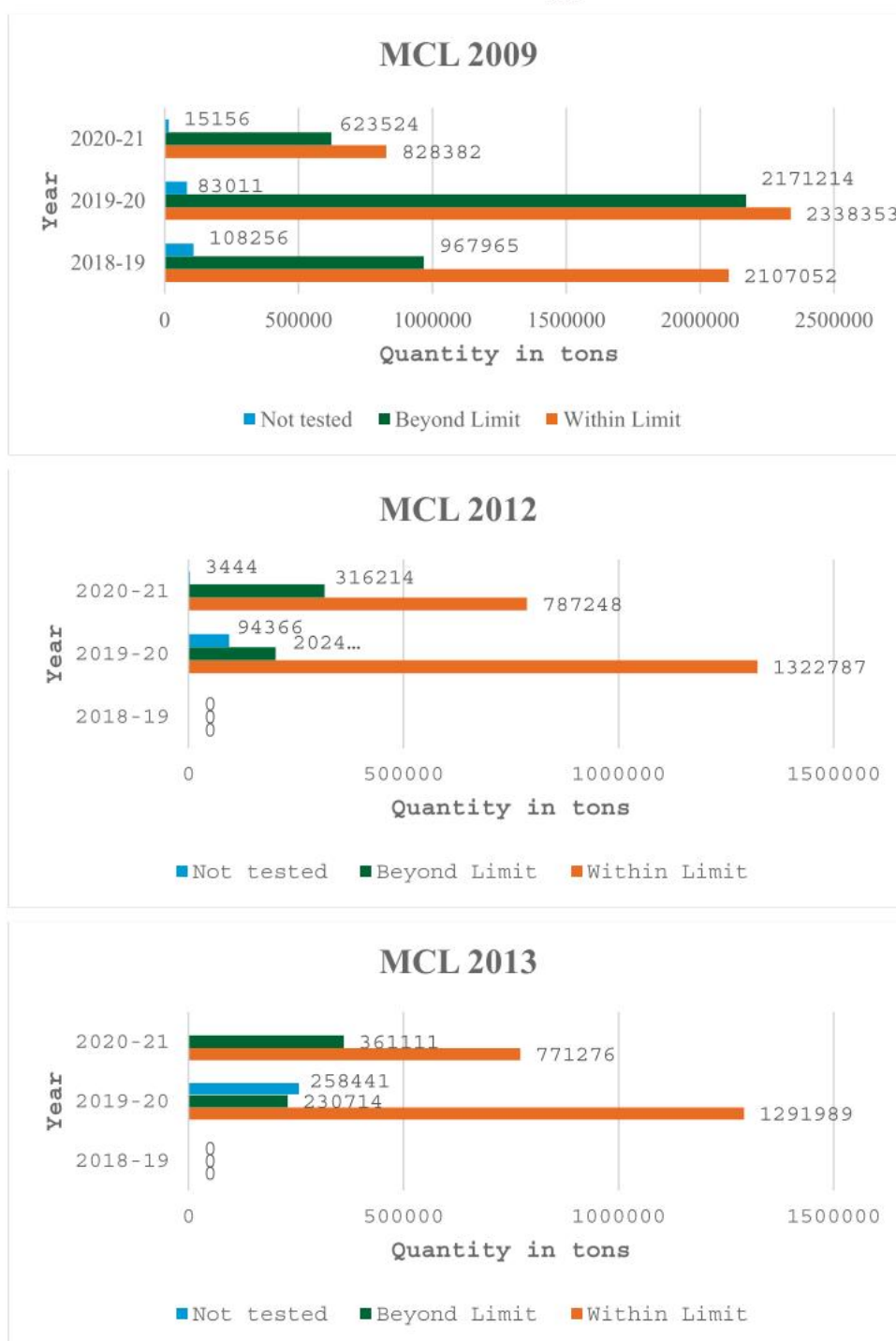
Audit test checked the details of grade of coal billed and received in respect of supplies made by MCL for the period from 2018-19 to 2020-21²⁴ in respect of three FSAs (2009, 2012 and 2013) and observed that the actual grade of the coal supplied was far below the declared grade of coal (based on the sampling analysis reports from the unloading end) as depicted in **Chart 7** given below:

²² Wagon haulage charges refer to charges levied for transporting goods from one location to another by rail using wagons.

²³ Para No.2.8.1 of Audit Report for the year ending 31 March 2019 (Report No. 2 of 2021).

²⁴ From April 2021, reconciliation of bills is pending. Further, in respect of MCL 2012 and 2013, data for 2018-19 also not made available.

Chart 7: Details of Grade of coal supplied for three FSAs



Source: Details provided by TANGEDCO

Audit noticed deviation in 12.50 per cent to 42.50 per cent of the consignments received by TANGEDCO during the above period. Further, in respect of 17.55 lakh tons of coal (representing 10.92 per cent), either testing was not done, or test results were not available, and payments were made based on billed grade only.

As per Clause 4.2 of FSA, the coal companies should make adequate arrangements to assess the quality and monitor the same to endeavour that ungraded coal was not loaded into purchaser's containers. As per Clause

4.5(ii) of FSA, if the grade analysed show variation from the declared grade consistently over a period of three months, the purchasers should request the coal company for re-declaration of grade which should be considered by the seller. This issue has already been pointed out in our earlier Report²⁵ and TANGEDCO failed to take up the issue of drop in GCV with the coal companies for corrective action and continued to accept the lesser grade coal by regulating the payment based on the tested grade of the coal.

In the absence of reconciliation data from April 2021, audit could not verify and comment on the quality of coal supplied.

ii) Between receipt point at power station and at Bunkers

The CEA, after considering the view of specialist agencies in the field of coal (such as CIMFR and CPRI) has acknowledged that there is loss of GCV from the point of 'as received' to the 'as fired' inside a power plant mainly due to (i) effect of moisture in GCV of coal sample taken from Wagon Top, (ii) loss in GCV during coal storage inside power plant and (iii) reduction in GCV during handling inside power plant. Based on this, CEA concluded (November 2017) that a margin of 105-120 kcal/kg for a non-pit head station to be considered as a loss of GCV till the point of firing of coal in boiler.

Audit compared the GCV of coal for the period from 2018-19 to 2022-23 in the selected two power stations and observed that the decrease in GCV from 'as received' stage to 'as fired' stage was more than the CEA permitted level of 120 kcal/kg for storage period of 30 days. The drop in GCV within the TPS premises, after considering normative loss has been given in **Annexure-12**.

The drop prevailed in 34 months and 47 months respectively during the review period for MTPS-II and NCTPS-II in respect of Indian coal and 27 months and 34 months respectively for the two stations in respect of imported coal. The drop in GCV of Indian coal was in the range of 127-423 Kcal/kg and 126-635 Kcal/kg for MTPS-II and NCTPS-II respectively and the Gross Calorific Value (GCV) drop of imported coal was even more than 500 Kcal/kg and 1100 Kcal/kg for these power stations against the maximum limit of 120 Kcal/kg.

iii) During direct feeding on the same day

Audit further analysed the GCV difference in case of coal being fed into the bunkers during the same day of receipt without routing through stock yard in MTPS-II (there was no direct feeding during the audit period in respect of NCTPS-II except for two months²⁶). As the coal was fed on the same day, there should not be any drop in GCV, whereas Audit observed that there were huge differences in GCV (**Annexure-13(a) and (b)**) which was up to 383 Kcal/kg and 501 Kcal/kg during the audit period in respect of indigenous and imported coal respectively even when coal was consumed on the same day.

²⁵ Para 2.9.8 of Audit Report for the year ending 31 March 2019 (Report No. 2 of 2021).

²⁶ February 2022 and March 2022.

TANGEDCO failed to analyse the reasons for drop in GCV in the above cases which would lead to increased energy charges and consequent higher burden on the consumers.

The Government replied (January 2025) that rake-wise samples were collected for Rail mode supply and Truck wise samples were taken for road cum rail mode by the third party sampling agency and grade of coal will be analysed and communicated. Further, it stated that the coal received at load ports are mixed and stacked before despatching to discharge ports through vessels. Hence, mine end grades of coal and unloading end grades are not comparable. However, it accepted that the payments are made as per the results communicated by testing agency only and also accepted the fact that the testing was not done for some of the rakes and payments were made as per FSA.

The reply is not acceptable since TANGEDCO did not establish a robust mechanism to cross check the quality of coal on rake-to-rake basis at load ports and the issue persisted during the entire audit period which lacked justification.

iv) Acceptance of lower grade coal resulted in excess consumption

The GCV of coal being used as the value of energy input, determines the Station Heat Rate (SHR). Usage of lower grade coal will lead to higher SHR and a plant with higher SHR will consume more fuel in comparison to other plants with lower SHR. Therefore, any increase/decrease in GCV affects the cost of power directly.

The agreed grade of coal was G8²⁷ to G13²⁸ whereas MTPS-II and NCTPS-II received less than G13 grade in 36 and 28 months (out of 60 months) respectively which led to higher SHR (ranging between 2403 and 2594 Kcal/kWh) as against the plant design of 2,251 Kcal/kWh (MTPS-II) and 2,252 Kcal/kWh (NCTPS-II). Hence, the power stations had to use additional coal to the extent of 40.05 lakh MT to meet out the generation. This had increased the specific coal consumption over and above the plant design which led to avoidable expenditure to the extent of ₹1,563.60 crore during the review period.

The Government stated (January 2025) that higher SHR against the design SHR was not due to coal quality alone and depends on various factors that influences the power generation. Hence, mapping SHR with coal quality alone is not correct.

The reply is not tenable as SHR mainly depends on the quality of coal and the higher SHR against the plant design was the consequence of low and poor quality of coal only.

²⁷ GCV of 4,900 to 5,200 Kcal/kWh

²⁸ GCV of 3,400 to 3,700 Kcal/kWh

v) Excess payment made for lower grade imported coal

The POs issued for import of coal prescribed the GCV, total moisture, ash content and the acceptable ranges for the specification. The quantity of coal will be adjusted vessel wise for total moisture and ash content based on the analysis done at discharge port and the price of the coal will be adjusted accordingly.

TANGEDCO adopts the discharge port sample analysis report for making payment even though the sample test reports of Customs Department (tested in its laboratory) are available for cross verification. Audit scrutinised the test reports of Customs Department independently and noticed that in 86 (out of 139) consignments tested by the Customs Department, the quality of coal was inferior in 40 consignments when compared to the PO specification. Thus, TANGEDCO had accepted lower grade of coal and made payment for higher quality as per the test results submitted by the suppliers. This led to avoidable excess payment of ₹204 crore.

The Government replied (January 2025) that the payments for imported coal was made based on the results furnished by third party agencies as per PO conditions. Further, it was stated that TANGEDCO had sent samples to Central Power Research Institute (CPRI) for cross reference and penalties are being deducted from the bills of suppliers for deviations. It also added that Customs Department test results are not being shared with them and as per PO condition, it is not possible to deduct any amount based on quality results issued by Customs.

The contention of the Government that it is not possible to deduct any amount based on quality results issued by the Customs Department does not hold good as the test results from the Customs Department can very well form the basis for further checking by the third party agencies, which has been the current practice, and based on the variations in these quality test results penalties can be imposed by TANGEDCO thus safeguarding its financial interests.

Though similar issue was pointed out in the earlier CAG Report²⁹, no action has been taken by TANGEDCO to safeguard its interests. Thus, it is very clear that TANGEDCO did not take any effective action to obtain the test results of Customs Department despite lapse of more than seven years. Further, TANGEDCO itself referred certain samples to CPRI for cross verification even after conducting the tests by third party agencies and levied penalties for poor quality which indicated that the third-party results are not always reliable.

4.2.8 Non-recovery of compensation for idle freight

Coal is transported to the thermal power plants through Railways for which it charges freight on the basis of Permissible Carrying Capacity³⁰ (PCC) of the wagon. As per the FSA, the freight charges are to be billed based on the

²⁹ Para No.3.10.8 of Audit Report for the year ending 31 March 2017 (Report No.5 of 2017).

³⁰ PCC is the maximum carrying capacity of wagon decided by Railways on the basis of various factors such as route and type of commodity to be carried.

Stencilled Carrying Capacity³¹ (SCC) or Carrying Capacity (CC), also known as the chargeable weight, of the wagons used. As per Clause 10.1 of the FSA, any penal freight charged by the Railways for overloading³² a consignment is to be paid by the purchaser (TANGEDCO) while any idle freight³³ for under loading below the SCC or CC based on the actual tare weight³⁴ plus two tons is to be borne by the seller, i.e., Coal Companies.

While there was no mention about the PCC in the agreement on which Railway charges the freight, the coal companies have considered the same for arriving overloading of wagons and penal charges levied accordingly. However, CC of 55.68 tons per wagon was considered (without any base) for levying underloading charges, which is not in order. Further, TANGEDCO had to pay freight charges for the entire PCC even if the quantity loaded was less than PCC which led to unfruitful payment of freight charges.

When the above issue was addressed to Government (April 2020)³⁵, it was replied (September/ October 2020) that necessary provision of recovery for under loading would be included in the ensuing contract which was due for renewal during the next year. However, audit observed that TANGEDCO failed to incorporate suitable unambiguous provisions to claim the idle freight charges in the subsequently amended (August 2023) contract also. Further, when the basis of considering CC of 55.68 tons was raised during the current audit, TANGEDCO has addressed (June 2024) MCL to correct the PCC in Rake Dispatch Statement as per Railways and the supplier's response is awaited.

Thus, due to non-inclusion of clause regarding recovery of idle freight based on PCC (instead of CC) from the coal handling contractors viz., VPT, KCT Brothers and Karaikal Port (except Gangavaram Port)³⁶, TANGEDCO incurred excess expenditure of ₹147.27 crore³⁷.

The Government replied (January 2025) that MCL's response is awaited regarding incorrect consideration of 55.68 tons for CC and assured that necessary adjustments would be done once confirmation is received. It was further stated that TANGEDCO has made several correspondences regarding idle freight and the response is awaited from MCL. The fact remains that TANGEDCO has initiated action (June 2024) only after pointed out by Audit.

³¹ Stenciled carrying capacity means the weight that is stenciled or marked on a wagon. This marking provides a clear indication of the safe weight that the wagon can carry without risking damage to the structure or compromising safety during transportation.

³² Overloading means any quantity loaded over and above the Permissible Carrying Capacity (PCC).

³³ The freight charges payable based on the stenciled carrying capacity displayed on the wagon or the carrying capacity plus two tons, minus the freight payable as per the actual recorded weight of the wagon.

³⁴ Tare weight is the weight of an empty container.

³⁵ Para 2.8.7 of Audit Report for the year ending 31 March 2019 (Report No. 2 of 2021)

³⁶ The clause for recovery of under loading railway freight charges was included in PO.

³⁷ Out of actual amount to be claimed (₹169.11 crore) towards underloading considering the PCC, an amount of ₹21.84 crore was adjusted by the coal companies towards idle freight based on the CC.

4.2.9 Excess expenditure in coal movements

4.2.9.1 Non-availing benefits of priority berthing

TANGEDCO entered (May 2022) into MOU with Paradip East Quay Coal Terminal Private Limited (PEQCTPL) for handling cargo (April 2022 to March 2023) at a tariff structure approved and notified by the Tariff Authority for Major Ports (TAMP). Even though the composite rate per MT was ₹187.14, it offered the discounted rate of ₹172.43 to match it to the PPT rate of ₹172.43 for the cargos handled at 30 lakh tonnes per annum as requested by TANGEDCO. Additionally, to avoid pre-berthing delays, TANGEDCO enrolled (2022-23) under Priority Berthing Scheme (PBS)³⁸ of Paradip Port by paying ₹85.80 crore towards Irrevocable Bank Guarantee (BG).

In this connection, Audit observed the following:

- For Coal handling at PEQCTPL berth, KCT (coal handling contractor) insisted to pay ₹29.68 per MT in addition to the composite rate of ₹172.43 per MT as Terminal charges to the Port. In this regard, it was noticed that in the quote submitted by PEQCTPL the composite rate mentioned was inclusive of terminal charges. However, during 2022-23 alone, TANGEDCO paid ₹15.29 crore towards handling of 51.53 Lakh MT of coal through PEQCTPL Berth (April 2022 to April 2023) in addition to composite cargo handling charges (₹88.86 crore), which could have been avoided had it been negotiated with PEQCTPL while entering into MOU.

The Government replied (January 2025) that when the issue was addressed (November 2023) by mentioning the audit observation, Paradip Port had replied that terminal charges are statutory levies fixed by Railway Board. Further, it was stated that the subject was again raised by TANGEDCO during the meeting (January 2024) and the representative of PEQCTPL informed that the subject was under discussion with the competent authority to finalise the proposal for cost reduction. The reply is not acceptable since TANGEDCO should have analysed the components of the composite rate before entering MoU with PEQCTPL and could have negotiated effectively to avoid the additional expenditure.

- During the period from April 2022 to April 2023, TANGEDCO paid ₹6.88 crore (including IGST) as demurrage charges to vessel owners in three Voyage charters³⁹. Even though priority berthing was availed by TANGEDCO and MOU entered with PEQCTPL, payment of demurrage charges for awaiting berthing at Paradip lacked justification. TANGEDCO failed in this regard to claim the reimbursement stating that it had availed priority berthing.

The Government replied (January 2025) that demurrage charges due to pre-berthing delay occurs owing to various factors (viz., less receipt of coal, nomination of vessels to berth on first come first basis, non-

³⁸ PBS is for getting priority berthing in Paradip Port Trust Berths.

³⁹ CP 87 dt.5/10/21, 95 dt 14/2/22 and 105 dt. 11/10/22

availability of dedicated coal berths, etc.) and are beyond the control of TANGEDCO. The reply is not acceptable since the very purpose of availing priority berthing scheme is to avoid such demurrage charges. Hence, the payment of demurrage charge was an infructuous expenditure to TANGEDCO.

Thus, TANGEDCO had made avoidable payment of ₹22.17 crore⁴⁰ towards coal handling charges and demurrage/PBS charges, due to failure to negotiate at the time of MOU and non-availing of benefits of priority berthing.

4.2.9.2 Review of direct chartering of vessels by TANGEDCO

TANGEDCO started chartering (August 2019 onwards) of vessels directly from M/s. Shipping Corporation of India Limited (SCIL) by way of Voyage Charter⁴¹, Time Charter and Nomination basis to move coal from load ports of Paradip, Vizag and Gangavaram to discharge ports at Ennore, Karaikal and Tuticorin. In this regard, TANGEDCO issued 39 Charter Party⁴² (CP) agreements as detailed in **Table 23** below:

Table 23: Details of Charter Party fixtures issued by TANGEDCO

Year	Time charter	Voyage Charter	Nomination	Total
2020-21	9	-	--	9
2021-22	4	4	3	11
2022-23	16	-	3	19
Total	29	4	6	39

Source: Charter Party Agreements

Audit observed that the vessels were waiting (for cargo/coal or due to other vessels of TANGEDCO) at Load Port and Discharge Port after arrival to the port, in 646 voyages in 28 Time Charter and in six Nomination based charters. Loss due to pre-berth delays in time charter was ₹250.85 crore⁴³.

Though TANGEDCO started direct chartering, it did not employ logistics experts for the same and incurred loss towards pre-berth delays.

The Government replied (January 2025) that TANGEDCO took over the direct chartering from M/s. PSC Limited and continued managing coal logistics. Further, it was stated that TANGEDCO estimates the pre-berthing delay for load and discharge port as 0.5 day/port while processing tender. The reply is not tenable because Audit has already considered the same 0.5 day/port to arrive the pre-berthing delay (i.e. one day for load and discharge port respectively) and arrived at the loss. Further, TANGEDCO has not engaged logistics experts for vessel chartering till date.

Thus, it could be seen from the above findings on coal operations that the whole operation of coal from mines to the plants were not managed in a prudent and cost effective manner. There were shortages in supply

⁴⁰ Handling - ₹15.29 crore and Demurrage - ₹6.88 crore (₹2.26 crore to PPT and ₹4.62 crore to Karaikal)

⁴¹ Agreements entered in August 2019 and February 2020.

⁴² Similar to Purchase Order

⁴³ Worked out based on the details collected from Voyage files.

of domestic coal and hence, TANGEDCO had to import coal at a higher price. It was seen that despite the specific availability of clause regarding claiming of shortages of coal from the contractors, TANGEDCO neither calculated the shortage of coal for the past 23 years (2001-24) nor claimed compensation from the contractors. Non-inclusion of specific clause for recovery of idle freight based on permissible carrying capacity in coal handling contract indicated poor planning of TANGEDCO with consequent extra expenditure. TANGEDCO's failure to check the quality of coal at various stages resulted in acceptance of poor-quality coal with consequent infructuous expenditure. Further, it incurred avoidable expenditure due to pre-berthing delays and demurrage charges even after availing priority berthing.

Recommendations:

TANGEDCO should –

1. Claim the shortage in supply of coal with the contractors periodically to avoid additional expenditures;
2. Gear up the reconciliation procedures without further delay to claim the loss in transit;
3. Consider the test reports of Customs Department for cross-checking the quality of coal before making payments;
4. Effectively follow up with MCL to get the contract amended for recovering idle freight based on Permissible Carrying Capacity instead of Carrying Capacity; and
5. Prepare hedging policies against foreign exchange variations for its contracts.

4.3 Capacity Additions planned by TANGEDCO

TANGEDCO has undertaken five thermal power projects with total capacity of 5,700 MW for implementation of the capacity addition programme. **Table 24** below shows the projects planned, scheduled date of completion and the progress achieved by the five thermal projects.

Table 24: Status of new projects being implemented by TANGEDCO

Sl. No.	Project	Date of award of contract	Scheduled date of commissioning	Percentage of progress (March 2023)	Revised scheduled date of commissioning	Delay (months) up to March 2023
1	North Chennai-III (1x800 MW)	29.01.2016	28.07.2019	94	December 2024	44
2	Udangudi (2x660 MW)	07.12.2017	06.06.2021	74	June 2025	21
3	Ennore SEZ (2x660 MW)	27.09.2014	26.03.2018	64	March 2026	60
4	ETPS Expansion (1x660 MW)	30.05.2014 09.03.2022 ⁴⁴	09.04.2018/ 08.03.2025	18 ⁴⁵	Shelved	59
5	Uppur (2x800 MW)	27.02.2016	02.02.2021	35	On hold	25

Source: Statistics at a Glance 2023 and Progress Report of TANGEDCO

⁴⁴ First contract terminated and second contract awarded to another contractor.

⁴⁵ Physical progress for first contract was 17 per cent and second contract was 01 per cent.

It could be seen from the above table that –

- The projects were approved by the Board of Directors of TANGEDCO (Board) between 2006 and 2010. However, the work for execution of the projects were awarded with a delay of more than five years from the date of approval i.e. between 2014 and 2017 though these projects were proposed to bridge the demand-availability gap of power in the State and to enhance the self-owned generation in order to have a better control in meeting the future power demand of the State. Had these five thermal power stations been implemented in time, TANGEDCO could have saved ₹13,182 crore for one year (2022-23) alone by way of savings when compared to the purchase of power at higher cost.
- All the five projects proposed to be completed before June 2021 initially have not been commissioned as per schedule and are still in various stages (18 to 94 *per cent*) of completion (March 2024).
- As per the CERC Regulation 15 (2009) (Appendix II), 50 months have been given for completing the extension projects (660/800 MW) and subsequent units have been given 56 months. It was however seen that TANGEDCO has exceeded the above norms beyond 13 to 56 months (March 2023). Consequently, the financials of TANGEDCO would be adversely affected due to increase in levelized tariff on account of increase in project costs including IDC. Further, this increased IDC (amounting to ₹3,611.97 crore in respect of three projects⁴⁶, as of March 2023) is likely to be disallowed at the time of finalization of capital cost of the projects concerned by TNERC as was done in respect of two power stations (MTPS-II and NCTPS-II). Hence TANGEDCO would not be able to supply power at economical cost and would remain way behind in merit order dispatch.

The observations on the power projects being implemented by TANGEDCO are given below:

4.3.1 North Chennai Supercritical Thermal Power Project Stage-III (1x800 MW)

NCTPS-III with 1x800 MW capacity was scheduled to be commissioned by 2019-20. It was decided to execute the project in two EPC packages viz., Boiler Turbine and Generator (BTG) and Balance of Plant (BoP) for better project management and for effecting reduction in the project cost as detailed in **Table 25** below:

⁴⁶ NCTPS-III (₹635.78 crore), Ennore SEZ (₹1,905.55 crore) and ETPS Expansion (₹1,070.64 crore).

Table 25: Details of contract awarded for NCTPS-III project

Package	Name of the contractor	Date of award	Awarded cost (₹ in crore)	Period of completion	Scheduled date of completion	Delay upto March 2023 (months)
Boiler Turbine Generator (BTG)	BHEL	29.01.2016	2,759.00	42	28.07.2019	39
Balance of Plant (BoP) and Civil works	BGRESL	28.10.2016	2,600.00	36	27.10.2019	36

Source: Details provided by TANGEDCO

It could be seen that there is a time over run of 36 to 39 months due to the factors explained below:

a) Delay in completing encasing work of cooling water pipeline

As per the tender specification, the existing old skimmer bay⁴⁷ demolition, erection of cooling water pipes (both in BoP and BTG area) and back filling within BoP area shall be under the scope of the BoP package. Demolition of existing structures in BTG area including skimmer bay and back filling within the BTG area was under the scope of the BTG contractor.

BoP contractor had demolished (July 2019) the skimmer bay and completed the work of laying pipeline in BTG area. The completed work was handed over (August 2019) to the BTG contractor for backfilling. The cooling water pipeline was however, not encased with concrete either by BTG or BoP contractor. Resultantly, the erected cooling water pipes got deformed (September 2019) and hence, further progress of work was stopped. TANGEDCO had to carry out the encasement work on its own and the same was completed in December 2022.

Audit observed that TANGEDCO failed to incorporate a clause in the scope of either of the agreement regarding encasement of cooling water pipeline and resultantly, this failure occurred. Hence, TANGEDCO could not fix responsibility also for the defect. Moreover, the cost of the cooling water pipe for the damaged portion amounting to ₹19.21 crore has not been recovered from the BoP contractor.

The Government replied (January 2025) that while execution of backfilling by BoP contractor, about 86 cooling water pipes failed by buckling due to rain which was beyond the control of both the EPC contractors. It was also stated that TANGEDCO had to carry out the rectification work in the interest of commissioning the project and the amount spent could not be avoided.

The reply is not tenable as TANGEDCO failed to include the scope of encasing in either of the agreement and hence, the encasing work was not carried out by both the contractors. Consequently, the pipelines deformed and led to additional expenditure of ₹19.21 crore towards repairing the same apart from the delay in carrying out the project. Further, the cost of the

⁴⁷ Skimmer Bay refers to a device to remove debris, oil or other floating material from surface of water body.

cooling water pipe for the damaged portion is also yet to be recovered (January 2025).

b) Delay in establishing coal handling system

The scope of the Balance of Plants (BoP) work includes entire coal handling system (CHS) consisting of interfacing of coal berth with the External Coal Handling System (ECHS) of SEZ plant. As the BoP contractor did not adhere to the milestones, TANGEDCO proposed commissioning of additional coal handling system (ACHS) and LOA was issued (February 2023) to M/s. Chennai Radha Engineering Works (CREW) at a total cost of ₹60.51 crore. The work was completed, and the contractor conducted (July 2023) trial run of all the conveyors. However, the BOP contractor is yet to complete (March 2024) the coal handling plant works.

Thus, TANGEDCO was forced to provide alternate coal handling arrangement at an additional cost of ₹49.52 crore. In addition to the capital expenditure, TANGEDCO has to incur an avoidable recurring expenditure of ₹0.58 crore per month towards the O&M of ACHS till the power station works are completed. Accordingly, an amount of ₹4.64 crore⁴⁸ was already paid till March 2024.

The Government replied (January 2025) that despite continuous monitoring, the BoP contractor failed to adhere to the time schedule to complete the CHS which forced TANGEDCO to go in for feeding coal to NCTPS-III on contingency measure by linking the NCTPS-I conveyors. It was also stated that the expenditure incurred could not be avoided.

The reply of the Government is not acceptable as the ACHS was executed since the original contractor could not complete the CHP work as per the contract. Failure of the contractor to complete CHP within the scheduled time forced TANGEDCO to commission additional coal handling system at ₹49.52 crore and continued to pay O&M charges. Further, the contractor is yet to complete CHP (December 2024).

c) Failure to get environmental clearance for laying ash slurry pipeline

TANGEDCO applied (May 2015) for Environmental Clearance (EC) and MoEF accorded (January 2016) approval for the project. The proposed ash slurry disposal and recovery water lines have to cross Buckingham canal and Kosasthalaiyar river by constructing pedestals. While the piling⁴⁹ work was in progress (22 out of 38 piles completed), the local fishermen filed a case (May 2021) before National Green Tribunal (NGT) stating that EC was obtained for collection of ash pond water for slurry making only and not for construction of ash slurry pipeline across Kosasthalaiyar river for carrying ash slurry from plant to ash dyke. NGT pronounced (January 2022) order directing TANGEDCO to pay compensation of ₹0.50 crore and to get permission from MoEF for construction of ash slurry pipeline for carrying ash slurry through an amended order.

⁴⁸ From August 2023 to March 2024 (8 Months)

⁴⁹ Piling work involves erection of long columns to create a strong foundation for a structure.

TANGEDCO had stopped the construction of ash slurry pipeline and initiated the process of getting amended order. The amended EC is yet to be obtained (December 2024).

Thus, TANGEDCO sought permission from MoEF for collection of ash pond water and failed to get EC for laying ash slurry pipeline. Further, it awarded the BoP contract without EC and insisted the contractor for execution of work. Failure to get EC for laying of ash slurry pipeline from the project site to ash dyke delayed the project. Even if the projects are commissioned, the plant cannot achieve COD till TANGEDCO paved the way for fly ash movement.

d) Status of the project

While both the BTG and ACHS packages for the project were completed fully, the BoP package has achieved 95 *per cent* only (March 2024). The EPC contractor stopped their work (February 2024) and withdrew their project activities (due to insolvency) without any intimation to TANGEDCO which totally derailed the erection and commissioning of the project. When TANGEDCO requested to resume the activities, the contractor did not respond and hence, the bank guarantee submitted by the contractor amounting to ₹77.83 crore was invoked (March 2024). In this connection, Audit observed the following:

- Despite granting of extension of time eight times without prejudice to LD, the contractor (BGRESL) left the work after completing 95 *per cent*. The financial progress achieved (March 2024) was 94 *per cent* (₹2,582.82 crore).
- Interest bearing advance amounting to ₹30.00 crore was paid by TANGEDCO to the sub vendors of the BoP contractor (BGRESL) to continue the work. No pending works could be completed by the sub-vendors.
- The ash handling plant was completed partially, and the coal handling plant has not been completed till date (March 2025).
- Tendering process for all the balance pending works for continuous running of the plant is under progress (March 2025) which may take another 24 months tentatively (i.e. March 2027) for finalisation.

Thus, the NCTPS-III Project which was slated to be commissioned by October 2019 is still under progress and is scheduled to be commissioned tentatively by March 2027 i.e. after a delay of 98 months. The tentative time schedule, however, is subject to change based on the response of the MoEF on the matter of ash slurry line passing through Buckingham Canal.

4.3.2 Udangudi Supercritical Thermal Power Project (2x660 MW)

TANGEDCO awarded the contract for establishment of the project on single package (BTG and BoP) to M/s. BHEL and construction of coal jetty to M/s. ITD Cementation as detailed in **Table 26** below:

Table 26: Details of contracts awarded for Udangudi Project

Package	Name of the contractor	Date of award	Awarded cost (₹ crore)	Period of completion (months)	Scheduled date of completion	Delay upto March 2023 (months)
EPC (BTG, BoP, SWIO)	BHEL	07.12.2017	7,359	42	06.06.2021	21
Coal Jetty	ITD Cementation	13.02.2018	1,902	30	13.08.2020	31

Source: Details provided by TANGEDCO

The scheduled date of commercial operation of the project was June 2021. However, 74 percentage of the work was only completed (March 2023) due to improper planning, non-following the instructions contained in the EC, lack of experience of contractor, etc. The issues which led to delay are discussed below:

a) Delay in approval of drawings and handing over the land

TANGEDCO awarded (May 2018) the consultancy contract to an engineering consultant (M/s Desein) to ensure proper interfacing issues arising between the contracts and co-ordination and monitoring the execution of works. BHEL submitted the drawings/documents related to the project to the consultant for approval. As the consultant could not approve the same within the stipulated time and expressed his inability (November 2018) to continue as engineering consultant, TANGEDCO short closed the consultancy contract (February 2019) and appointed (February 2019) another consultant (M/s TCE). However, TCE also approved the submitted drawings in September 2022 only. The approval of project drawings itself took more than 50 months, which contributed to the delay in commencing the construction work.

In the meantime, BHEL submitted (since November 2019) the basic engineering drawings/documents considering one Control System (Distributed Control System for the operation of power plants using automated solutions) and after 18 months, TANGEDCO insisted (March 2021) for an advanced version of control system which was finalised only in January 2023. This transition took 38 months (from November 2019 to January 2023) for finalization of control system model which resulted in delay in commissioning of the project.

In addition to the above, the land for Sea Water Intake Outfall system was made available by TANGEDCO to BHEL only in February 2021, after a delay of more than three years (i.e. from 2017) which also delayed the project to that extent.

b) Ineffective construction of SWIO system by the contractor causing damage and delay in execution

The construction of Sea Water Intake Outfall⁵⁰ system commenced in June 2019 and the pipe laying activities had to be carried out during the offshore

⁵⁰ A seawater intake and outfall system moves seawater into plants and disperses brine back into the ocean

seasons⁵¹ of 2020-21 and 2021-22. During the commencement of installation, the sacrificial walls⁵² of both intake wells got damaged (April 2023) and all the reinforcement got direct contact with seawater and needed to be re-casted for further installation in the offshore. BHEL failed to ascertain the durability of sacrificial wall based on the thickness, length and height for withstanding the structure during ‘towing and up to the sinking process’⁵³. Both the sacrificial walls were damaged and were not able to withstand the normal tidal force within the rock bund area.

Non-achievement of milestone as committed for each activity in the Sea water intake system led to postponement of the work to next season (December 2023 to April 2024). The major offshore activity of erection, installation/positioning of two numbers of intake wells and joining the intake piping system with the well are yet to be completed (March 2024) in the offshore. The contractor’s failure to ascertain the durability of the wall resulted in granting extension of time and consequent delay of the project.

The Government replied (January 2025) that the construction of the intake well was done strictly adhering to the Indian Standard Code of Practices and was executed in accordance with the approved drawings only. Further, it was stated that missing of fair weather in the previous years were due to Covid pandemic, delay in execution, etc.

The reply is not tenable since the contractor missed four offshore seasons and the first season only fell during the Covid pandemic period and the rest were only due to the ineffective carrying out the work. Further, the fact remains that the major offshore activity of erection, installation/ positioning of two numbers of intake wells and joining the intake piping system with the well are yet to be completed (March 2024).

c) Non-compliance to Government directions in providing surplus water channel

GoTN while alienating of Government land to TANGEDCO for establishing the project, had directed (2010) TANGEDCO to provide surplus water channel from Ellappanaicken tank and the nearby catchment area which was also reiterated in the EC issued (October 2013) by the MoEF. The topography of the project site was undulating and lying in low area. Ellappanaicken tank receives water from Ellappanaicken supply channel and after achieving the full tank level, the surplus water is released through Ellappanaicken surplus channel. The flow of water through the channel is restricted by number of check dams constructed in the channel. Due to restrictions imposed by the presence of check dams, the rainwater from the nearby catchment areas gets stagnant in the project premises. A report submitted by Anna University in this regard has suggested to make some regulation arrangements in the check dams (such as sluice gate) so that they

⁵¹ Offshore season: December to April of each year considering the nature of sea.

⁵² Used to accurately form a concrete guide wall which is critical in the positioning and alignment of piles.

⁵³ This process involves taking the cylinder in crane and dropping it in the well. This can be done only during non-windy season. Otherwise, the cylindrical pipe will start moving and struck the concrete wall and break.

can be opened during the flood period leading to quicker drainage of flood water.

It was proposed that the plant boundary wall should have been elevated above the check dam level to stop water from entering inside the plant premises. However, it was noticed that water was passing below the boundary wall in the project area due to the velocity of water flow. Hence, the main plant area was flooded during October 2019 and the EPC contractor was forced to suspend the construction works for more than 15 months up to April 2020. Further, during the subsequent monsoon seasons (between October and December 2020) also, the construction activities got affected due to water logging and the project work was delayed every time.

Ingress of huge volume of water due to overflow of Ellappanaicken tank inside the plant premises and measures to control the same from entering inside the plant premises was in the scope of TANGEDCO. However, TANGEDCO failed to provide the surplus course channel and any regulation arrangement suggested by Anna University.

Thus, non-compliance to Government directions and EC led to flooding/ water logging with consequential delay in executing the Project. Moreover, the surplus course channel is yet to be provided to the contractor for execution of the work (March 2024).

The Government replied (January 2025) that the surplus channel work was already in the EPC contractor's scope and the same was deleted due to the land acquisition proposal of Stage II and III of Udangudi project at the pre-bid stage. It was also stated that necessary alternate arrangements were made which will protect the entry of surplus water inside the plant.

However, Audit observed that despite GoTN's direction (2010) to provide surplus water channel which was also reiterated in EC, neither surplus water channel nor any arrangement in check dams was provided and resulted in flooding and stoppage of construction activities frequently.

Thus, due to non-adherence to MoEF directions and due to delay in (i) approval of drawing by the consultant, (ii) finalisation of control system model, (iii) handing over the required land to BHEL, TANGEDCO could not adhere to scheduled date of completion. Further, despite granting extension of time, the EPC contractor is yet to complete works relating to BOP and only 82 per cent of the works have been completed even after a delay of 43 months (March 2024).

4.3.3 Ennore SEZ Supercritical Thermal Power Project (2x660 MW)

The EPC contract was awarded as two packages (BTG, BoP and SWIO, as a single package and External Coal Handling Plant (ECHP) and shore unloading as another package), as detailed in **Table 27** below:

Table 27: Details of EPC contracts awarded

Package	Name of the contractor	Date of award	Awarded cost (₹ crore)	Period of completion (months)	Scheduled date of completion	Delay upto March 2023 (months)
EPC (BTG, BoP & SWIO)	BHEL	27.09.2014	7,814	42	26.03.2018	60
ECHP and shore unloading	CREW	19.01.2019	170	18	19.07.2020	32

Source: Details provided by TANGEDCO

The scheduled date of completion (March 2018) was extended to September 2019, i.e. 407 days (between September 2015 and October 2016), due to litigation⁵⁴ and further extension of time was also granted (up to October 2020, August 2022 and May 2024) to BHEL. Despite giving repeated extension of times, the project is yet to be commissioned (March 2024) even after five years from the scheduled date. The discrepancies noticed in this regard are explained below.

a) Construction of coal conveyor transportation system in contravention to route approved by MoEF

MoEF and TNPCB accorded consent (January and March 2014) for establishment of the power station with specific conditions, viz., the project shall be executed in such a manner that there shall not be any disturbance to the local fishing activity, the unit shall transport the coal from the coal berth to the proposed site through pipe conveyors system and shall not create hindrance to the local public, etc. It was further stated that in case of any deviation or alteration in the project proposed including coal transportation system from those submitted to the MoEF for clearance, fresh reference should be made to the Ministry to assess the adequacy of the condition imposed and to add additional protection measures required.

TANGEDCO proposed (May 2013) to convey coal from coal berth-3 of Ennore port to the project site and had availed EC accordingly. The coal transportation system, for which EC was obtained, was a straight conveyor and passes through the coal stockyard of a private firm⁵⁵. Hence, TANGEDCO was constrained to erect the coal conveyor system as per proposed plan approved by MoEF. Subsequently, TANGEDCO preferred to erect closed pipe conveyor system in a curvilinear manner from Ennore port to project site.

The BoP contractor submitted the drawing for coal transportation system by avoiding the route through the coal stockyard of the private firm and the altered route passes through Kosasthalaiyar river and mangrove. Though the proposed route deviated from the approval accorded by MoEF, TANGEDCO approved the altered route without consulting MoEF. While carrying out the work of laying coal transportation system, the general public agitated (July 2021) against the construction of piles in Kosasthalaiyar river. NGT directed (January 2022) to restore the backwater to its normalcy and also directed to

⁵⁴ Trishe consortium was among the two, out of four bidders, who qualified in Bid Qualification Requirement. Since the bid was rejected and tender was lodged, case was filed by the consortium.

⁵⁵ Chettinadu Coal stock yard.

pay penalty of ₹4.12 crore as compensation for damage. Further, an additional compensation of ₹0.50 crore had to be paid to TNPCB for violating the EC/CRZ. Hence, the constructions made within backwater (i.e., Coastal Regulatory Zone area) were removed (February 2022) by cutting of pile foundations. TANGEDCO had initiated application of amendment in the EC and Coastal Regulatory Zone clearance for modification in alignment of coal conveyor.

Thus, due to lack of proper due diligence and planning, TANGEDCO had availed EC for erection of coal conveyor transportation system without ensuring the ownership of land of private coal stockyard/availing Right of Way from the owner of land. Due to opposition from private landowner, TANGEDCO approved construction of closed pipe conveyor system without getting fresh clearance from the MoEF. This led to stoppage of work and removal of already constructed pile structure from July 2021 and hence, TANGEDCO could not adhere to the milestone in commissioning the plant.

The Government replied (January 2025) that since the coal conveyor passes through Kosasthalaiyar River, a pipe conveyor for transporting the coal was proposed instead of straight conveyor to avoid spillage of coal in the water bodies and to avoid passing through the private coal stock yard. It was added that the fishermen filed a case stating that the pipe conveyor route covered major area of water body affecting the flow of water causing inconvenience to boat movement. It was also stated that the delay in execution of coal conveyor system will not affect the commissioning of the plant.

The reply is not tenable as the modified path also affected mangroves and hence, NGT directed to remove the pillars and apply for fresh EC. Due to deviation and non-adherence to directions of MoEF, the work was suspended causing inordinate delay. Further, the delay in construction of coal conveyor system will also affect the commissioning of the plant as the route has not been finalised yet and approval from the MoEF has to be obtained for the new route (March 2025).

b) Delay in construction of External Coal Handling Plant

At the time of floating EPC tender (April 2013), M/s. Kamaraj Port Limited had not finalised the location of the coal berth (CB-3) which was intended for feeding coal for this project. Hence, the EPC contract for external coal handling system (ECHs) with shore unloading was excluded from the scope of main plant EPC. TANGEDCO twice (2014 and 2015) lodged the tenders floated for establishment of External Coal Handling Plant (ECHP) with shore unloaders at Coal Berth-3 due to non-fulfilment of Bid Qualification Requirement (BQR) conditions and higher price than estimated value. Subsequently another tender was floated, and M/s. CREW was awarded the EPC contract for conveying system package, including the coal feeding.

CREW had completed (December 2020) their portion of work and conducted initial trial run (March 2023) except PG test, whereas the work of shore unloader was yet to be completed (March 2024) by TANGEDCO. Further, the scope of coal conveying system from Coal Berth-3 to Ennore SEZ was in the scope of main contractor (BHEL) and the work was held up (March 2024) for want of EC (as stated in (a) above).

The equipments were kept idle for more than three years since erection due to non-completion of allied works. The standard warranty of 24 months for the materials supplied by CREW had also expired in December 2022.

As per Clause 24.1 (Final Acceptance) of the contract, in case PG test cannot be carried out at specified time due to reasons attributable to owner, the plant shall be taken over in 180 days after the intimation from the contractor provided the owner is satisfied about his readiness for conducting the PG test. As such, TANGEDCO was forced to accept the plant without PG test. TANGEDCO had issued (December 2022) an amendment order to CREW for provision of round the clock monitoring, safeguarding and periodical trial operation of coal conveying plant for an amount of ₹0.91 crore per year and TANGEDCO has been paying the amount from December 2022 onwards.

Thus, the asset created for ₹169.53 crore could not be put into use due to non-commissioning of related works and TANGEDCO has been incurring infructuous expenditure of ₹1.82 crore towards O&M (up to December 2024).

The Government accepted (January 2025) the observation and stated that ₹0.91 crore per annum was incurred to safeguard the already erected equipment. It was also stated that the asset is yet to be taken by TANGEDCO and PG test will be done in due course of time. However, the fact remains that due to TANGEDCO's failure and delay in getting EC, the coal handling system could not be implemented till date.

c) Poor workmanship of piling work

As per general conditions, the contractor had to commission two separate turbine generators (TG) for each unit. The work involved installation of 160 piles for each unit and based on the approved drawing, the contractor carried out (June 2017) the ground improvement for TG Unit-1. Subsequently, Reinforced Cement Concrete piling works for 160 piles were cast from August 2017 to January 2018. However, Structural Engineering Research Centre (SERC) conducted pile integrity test to assess and check the piles for potential problems and the report revealed that 111 out of 160 piles were short in length by two to three meters and the length of 49 piles were inconclusive. One out of six piles tested for vertical load test also failed.

BHEL carried out (January 2019) the compaction piling work without adopting the observation methodology recommended by IIT/Chennai and execution of piling works. Further, BHEL stopped the construction activities in TG area of unit – I from March 2018 due to defective piling and completed the column works during February 2020, after a delay of more than 18 months.

The Government accepted (January 2025) that the delay and non-adherence of milestone was due to defective casting of pile by BHEL. It was also stated that it is the responsibility of the EPC contractor to ensure the quality of work and the same was rectified as per IIT Madras recommendations. However, the reply is silent on the proposed action against the contractor for defective work which led to recasting work and consequent delay.

Thus, due to erection of coal conveyor system without ensuring the ownership of land, delay in construction of ECHS and poor

workmanship in piling work has delayed the project. Only 69 per cent of the work has been completed even after a delay of 72 months (March 2024).

4.3.4 ETPS Expansion Project (1x660 MW)

TANGEDCO invited (October 2012) tender for establishing 660 MW thermal power project along with External Coal Handling System in the site available at Ennore Thermal Power Station (ETPS) as a single EPC contract. The tender was finalised, and Letter of Intent (LOI) was issued (May 2014) to M/s. LANCO⁵⁶ for a contract price of ₹3,960.63 crore with scheduled completion date as October 2017 (39 months from zero date).

Audit noticed the following lapses in awarding the contract and execution of project.

a) Failure to assess the financial strength of the contractor

During the financial year 2011-12 (the year just preceding the bid evaluation), M/s LANCO was found with lack of financial resources and facing cash flow crisis. An independent evaluation of financial statements of LANCO revealed the following:

- Profit of the firm witnessed a steep fall in 2011-12 (from ₹200.18 crore to ₹115.67 crore) when compared to previous year;
- Total current liabilities increased three-fold (₹2,766.26 crore to ₹9,358.28 crore). This indicated too much pressure on the working capital requirement of the firm;
- Payment towards the current maturities of long-term borrowings increased by 309 per cent (₹202.43 crore to ₹828.42 crore) indicating liquidity crisis; and
- Current liabilities increased by 91 per cent (₹2,009.79 crore to ₹3,843.41 crore) indicating more pressure on working capital.

Financial strength of the bidder is an important criterion for timely completion of project requiring huge investment. To analyse the financial strength of the bidder, for instance, NTPC Limited, India's largest energy conglomerate has fixed criteria like, unutilized line of credit together with cash and bank balances should be equivalent to cost of project being awarded to contractor. Further, as per Rule 15 (2) of the Tamil Nadu Transparency in Tender Rules, 2000 (Tender Rules), the tender documents should include evaluation criteria to assess the financial status of the contractor. However, against this requirement, in the tender document for the above project, TANGEDCO included only one condition (item 4.1.2) of minimum annual turnover of ₹10,000 million⁵⁷ in any of the three preceding financial years and no other criteria was used to assess the financial strength of the bidders and their capability to mobilise the anticipated financial resources to execute the project. In the absence of effective evaluation criteria, fulfilment of turnover criteria alone was considered, and the said bid was accepted.

⁵⁶ Lagada Pafi Amarappa Naidu and Company

⁵⁷ ₹1,000 crore

Due to the financial problems in executing the project by LANCO, financial assistance was extended by TANGEDCO (in the form of issue of Letter of Credit in favour of its sub-vendors, payment of 90 *per cent* of customs duty, etc.). Despite these slews of concessions, the project came to a standstill (August 2017) due to corporate insolvency resolution process filed by IDBI on LANCO. Hence, the EPC contract awarded to LANCO was terminated (April 2018) for slow progress of work and insolvency of contractor. After a lapse of 37 months from the commencement of work, the progress was only 17 *per cent* up to August 2017. An amount of ₹1,050.04 crore (including mobilisation advance of ₹334.80 crore) was paid to the contractor for execution of the project till August 2017 and an amount of ₹876.51 crore was recovered through invoking the BG, retention amount, etc. TANGEDCO is now in the process of recovering the balance amount legally (March 2024).

Thus, TANGEDCO failed to assess the inherent financial weakness of LANCO depicted in their financial statements before bid evaluation, which was the essence of the Tender Rules stated *ibid*.

b) Repetitive failure in selecting alternate contractor

Fresh open tender was floated (August 2018) to identify a new EPC contractor to complete the balance works⁵⁸ (83 *per cent* of work) on “as is where is basis condition”. Only two bidders viz. M/s BGRESL and M/s BHEL had participated and M/s BGRESL was found to be the L1 bidder.

i) **Initial award to BGRESL:** TANGEDCO awarded (March 2019) the contract to BGRESL at a cost ₹4,442.70 crore in a single package. LOI was issued (December 2019) with the scheduled date of commissioning as 36 months (i.e., December 2022) from the date of award. As per the contract conditions, BGRESL has to submit Bank Guarantees (BG) *in-lieu of* Security Deposit cum Performance Bank Guarantee (SDCPBG) for a value of 10 *per cent* of contract value (₹444.27 crore) within 30 days from the date of LOI and the site will be handed over to the contractor only on submission of SDCPBG.

BGRESL requested TANGEDCO’s approval for submission of BG from a foreign bank which did not have any branch in India. This was not acceptable to TANGEDCO as the specification clearly mentioned that, only BGs from Nationalised Indian banks/Scheduled banks and any foreign banks which have branches in India are to be submitted. In this regard, RBI also clarified that such BGs are not generally permitted.

As BGRESL was unable to submit the required BG even after a lapse of 16 months from the date of LOI, the EPC contract issued to complete the balance of works was cancelled (April 2021) and it was proposed to shelve the project on the following grounds:

- Changed energy scenario with emphasis on Renewable Energy,
- Increase in cost of generation of coal-based power and MOD and
- Anticipated further increase in levelised tariff due to cost and time overrun.

⁵⁸ LANCO completed 17 *per cent* of works and balance 83 *per cent*

On receipt of LOI cancellation order, BGRESL filed a writ petition (April 2021) at Hon'ble High Court challenging the cancellation of LOI and to give directions to TANGEDCO to adopt three *per cent* SDCPBG. It was also requested to review the cancellation of LOI and reinstate the contract.

ii) **Reinstatement of BGRESL:** In the meantime, based on the Board's directions (April 2021), TANGEDCO requested GoTN orders for shelving the project. The Government in turn directed (July 2021) to examine and study the revival of the project since an amount of ₹792 crore was already spent on the project. Hence, a high-level committee was constituted (August 2021) by TANGEDCO to analyse the aspects for the revival of the project. Finally, the committee requested to re-examine the feasibility and viability of the project in the light of future energy demand and supply scenario for the State.

Hence, it was decided (March 2022) to reinstate the LOI with the new zero date, being the date of communication of reinstatement of the LOI and to issue amendment letter to BGRESL for submission of BGs as per the original LOI conditions, after withdrawal of writ petition filed by them against TANGEDCO by considering the following points:

- If the contract is revived, BGR will be in a position to commence the project soon.
- If the project is retendered, there is possibility that new vendor may insist on completely dismantling the already erected structure to suit their requirements which will increase the project completion schedule and cost.
- There will be a hike of at least 20 *per cent* in cost for new tender over the already discovered price due to cost escalation.

Hence, by accepting (January 2022) the recommendations of high-level committee, the Board resolved to revive the shelved ETPS expansion project, and to reinstate the LOI to BGRESL without any escalation of cost with new 'zero date' being the date of communication of reinstatement of LOI (March 2022).

TANGEDCO issued (March 2022) the amendment letter for the reinstatement of LOI and BGRESL had to submit BG for SDCPBG within thirty days from the date of reinstated LOI. BGRESL submitted (May 2022) BG for ₹128.28 crore with a delay of 36 days and the site was handed over in January 2022. BGRESL, over a period of 20 months, had completed only 0.60 *per cent* of the work (March 2024).

In this connection, Audit observed the following:

- TANGEDCO released (October 2021) the withheld amount of ₹121.43 crore (from the five *per cent* retention amount to be released on completion of PG test) and ₹27.36 crore as interest bearing advance amount to BGRESL. In addition, TANGEDCO released (October 2021) ₹106.06 crore for adjustment of GST against future supply. In spite of providing such financial assistances, the progress was very poor, and the very purpose of reinstatement did not yield the desired result.

- Further, Audit conducted an independent evaluation of financial statements of BGRESL and observed that the financial performance was deteriorating over the period and indicated pressure on working capital need. This was evident from the fact exhibited in the financial statements of the Company that the Earnings Before Interest and Tax (EBIT) showed a declining trend from 2018-19 onwards. The EBIT (₹41.12 crore) which showed a decrease of 36 *per cent* in 2018-19 over the previous year has further declined and recorded a loss of ₹64.12 crore in 2019-20. Further, the loss of the Company has increased to ₹475.27 crore (2020-21), just before reinstating LOI for the project.
- TANGEDCO did not conduct any financial analysis of BGRESL despite having previous two experiences (termination of LANCO and cancellation of initial LOI of BGRESL) and hence, it could not apprise the Committee, the fact of financial weakness of BGRESL led to reinstatement of financially weaker firm. Consequently, the project could not take up for about four years.

Thus, despite having previous experience with LANCO, TANGEDCO failed to analyse the financials of the subsequent bidder (BGRESL) also and ended up with locking up of funds and stalling of the project.

The Government replied (January 2025) that considering the merits and recommendations of the Expert Committee, the revival of the project and reinstatement of BGRESL was approved. The reply is not acceptable since when GoTN directed (July 2021) to re-examine the feasibility and viability of the project, TANGEDCO was aware that BGRESL had not adhered to scheduled date of completion due to financial constraints. Further, award of contract without conducting any study on the financial performance of the bidders was not justifiable.

4.3.5 Uppur Supercritical Thermal Power Project (2x800 MW)

TANGEDCO accorded approval (June 2015) to execute the Uppur project through three packages for better project management and for effecting reduction in project cost. The EPC contract awarded is detailed in **Table 28** below:

Table 28: Details of contracts awarded by TANGEDCO

Package	Name of the contractor	Date of award	Awarded cost (₹ in crore)	Period of completion	Scheduled date of completion	Delay upto March 2023 (months)
BTG	BHEL	27-02-2016	5,852.00	60	02-02-2021	25
BOP	Reliance Infra	21-02-2018	3,647.00	36	21-02-2021 (short closed)	25
SWIO	L & T	08-05-2018	1,067.60	36	08-05-2021	22

Source: Details provided by TANGEDCO

TANGEDCO decided to put on hold the project (April 2021) and the Government is yet to decide on the issue (March 2024). As such, the

scheduled date of completion lost its relevance. The major reasons for stalling the project and the resultant impact are discussed in the subsequent paragraphs:

a) Failure to identify appropriate land for the project

MoEF issued (May 2016) EC for Uppur project with a special condition that no water bodies including natural drainage system in the area should be disturbed due to activities associated with the construction of the power plant. Enter Upon Permission (EUP) for Government land was accorded (January 2016/August 2017) and acquisition process of 5.34 acres of temple land falling inside the main plant area is still pending (March 2024).

In the meantime, an appeal was filed (December 2017) by residents before NGT against the grant of EC cum CRZ clearance for the Uppur project citing that few areas of the project site obstruct the surplus water flow from the nearby tanks. NGT Southern Zone disposed of (March 2021) the appeal by directing TANGEDCO to comply with its directions within six months of the order. Consequently, TANGEDCO intimated (March 2021) the contractors for suspension of construction works and obtained (August 2021) stay from Apex Court against the orders of NGT. However, the work is yet to be resumed (March 2024) and TANGEDCO needs to acquire additional land for surplus water canal.

In this connection, Audit observed that TANGEDCO failed to conduct field study for identification of watercourse, in the area earmarked for power project. Further, it awarded the contract for establishment of power project without ensuring clear title of the land in its name. Thus, failure to conduct field study for identification of appropriate land resulted in postponement of Uppur STPP project.

The Government accepted (January 2025) that process of commissioning the project (availing EC and awarding of tender) was started on the basis of EUP for Government land but without ensuring possession of land belonging to Government, private parties and Hindu Religious & Charitable Endowments Department. This led to slow progress in erection works and cancellation of BoP contract.

b) Award of contract to a financially weaker firm and delay in handing over the required land resulted in termination of BoP package

In the contract awarded (BoP) to M/s. Reliance Infra (RIL), the total land requirement for the entire project was mentioned as 900 acres which was completely in possession of TANGEDCO. However, encumbrance free land to the extent of 552 acres only was handed over (March 2018) and balance land could not be handed over by TANGEDCO since the same was under litigation. Meantime RIL submitted (October 2018) the Security Deposit cum Performance Bank Guarantee of ₹359.74 crore with a delay of 174 days (from 23 March 2018 to 12 September 2018) and TANGEDCO failed to recover interest of ₹37.73 crore⁵⁹ for the belated submission of Security Deposit cum Performance Bank Guarantee as per the terms and conditions of LOI.

⁵⁹ ₹359.74 crore x 22 per cent * 174/365 days

Further, due to slow progress (only one *per cent* progress even after 24 months out of 36 months contract period), TANGEDCO issued show cause notice (September 2020) and decided (November 2020) for closure of the BOP contract mutually with RIL and refunded ₹402.13 crore (SD cum PBG, EMD, etc). Even though TANGEDCO approved (February 2021) to issue fresh tenders for the package, the same is yet to be finalised (December 2024). As the project was put on hold, there was no further progress, despite spending an amount of ₹20.43 crore (2019-20).

c) Idling of materials

The BTG contractor (BHEL) supplied (July 2019) 50 *per cent* (valuing ₹2,325 crore) of the materials for the project, (out of contract value of ₹4,636 crore). However, only 13 *per cent* of the supplied materials were utilised and materials valuing ₹2,020 crore are lying idle for more than five years in open (as shown in the **Picture 1**). The durability of the materials could not be ascertained.

Picture 1: Cooling water pipelines kept in open, surrounded by bushes.



TANGEDCO had paid (October 2023) ₹1,785 crore to BHEL for the materials supplied (towards 90 *per cent*) and balance is yet to be paid (December 2024).

Thus, due to improper planning, materials worth ₹2,020 crore supplied by BTG contractor is lying in idle condition over five years, for which TANGEDCO has paid interest as the project has been carried out using borrowed funds.

The Government replied (January 2025) that it is continuously taking various control measures to use the materials in beneficial way to avoid lying idle condition. It was also stated that high value materials are stored in closed shed as recommended by the OEM.

The reply of the Government is not acceptable since the durability of the material which is lying idle for more than five years is likely to deteriorate.

d) Infertuous expenditure incurred by TANGEDCO

TANGEDCO availed (December 2017) a loan of ₹4,708.62 crore for Uppur STPP. The Board decided (April 2021) to suspend the project and shift to Udangudi and addressed GoTN for approval. TANGEDCO started repayment (January 2018) of interest and paid ₹1,030.37 crores till suspension of work and ₹1,805.52 crores thereafter. PFC recalled (September 2023) its loan due to non-completion of work in time and the same was settled by TANGEDCO in January 2024. This has resulted in sunk cost to the extent of ₹7,544.51 crore⁶⁰.

In this connection Audit observed that the interest paid (₹1,805.52 crores) after suspension of work till loan settlement could have been avoided had the loan closure been done at the time of suspension itself.

The Government replied (January 2025) that the Board referred the issue to a committee seeking their expert views and the committee is yet to submit the report. It was also stated that if the loan of PFC was continued, it will be categorised as NPA, and hence it was decided to close the loan.

The reply of the Government is not tenable since the project could not adhere to the various milestones as stipulated in the agreement till the NGT order.

Thus, non-conducting field study for identification of appropriation of land as per the directions of MoEF, award of contract without handing over the required encumbrance free land to the BoP contractor resulted in stoppage of project execution work with consequent idling of material for more than five years without beneficial use. Further, on account of recalling of loan and interest by PFC, the entire expenditure incurred became infertuous.

⁶⁰ ₹4,708.62 crore (final payment) + ₹2,835.89 crore (already paid interest up to October 2023)

Recommendations:

TANGEDCO should -

- 1. Take appropriate action to obtain EC for laying ash slurry pipeline and speed up the tendering process for the balance pending works in respect of NCTPS-III project;**
- 2. Provide the required surplus water channel as directed by the Government and MoEF for Udangudi project to avoid further slippage of Udangudi project;**
- 3. Finalise the coal conveyor transportation route early without deviating the EC directions and complete the coal handling plant in Ennore SEZ project;**
- 4. Ascertain the financial strength of the bidders, as is being done by NTPC, before awarding the contracts in future, considering the failures faced in respect of ETPS Expansion project; and**
- 5. Draw up an action plan to resume the project work at Uppur so as to bring the project live and complete the execution work early to achieve the desired capacity addition.**

4.4 Coal tie-up for ongoing thermal Power Stations

As per the CEA norms, the requirement of coal is calculated considering an operational efficiency of 85 *per cent* PLF, Gross Calorific Value (GCV) of 3,400 Kcal/kg (G-13) and based on usage of blended coal (consisting of 50 *per cent* indigenous coal and 50 *per cent* imported coal). TANGEDCO was already having long-term FSA with CIL for the existing thermal power stations and the observations on coal linkage for the new thermal power stations are discussed in the following paragraphs.

4.4.1 Long term Coal Linkage for NCTPS-III and Uppur STPP

Out of the five Thermal Power Projects under execution, TANGEDCO applied (October 2016) to Ministry of Power (MoP) for long term coal linkage for two plants viz. NCTPS-III (1 x 800 MW) and Uppur STPP (2 x 800 MW). Since, these projects had no coal tie up, CEA recommended (February 2019) for long term linkage under SHAKTI Coal Linkage Policy-2017⁶¹ and the MoP requested (March 2019) Ministry of Coal (MoC) to grant long term linkage to the above projects. Scrutiny of FSA revealed the following:

4.4.1.1 Failure to specify the quantity of each Grade of Coal in the Agreement

It was recommended by CEA (February 2019) to procure G-13 grade coal for the power plants of NCTPS-III and Uppur. However, the FSA was entered with SCCL with the grade of G13/G15 in spite of the fact that higher percentage of ash content is available in G-15 (26.5 *per cent* in G-13 grade coal and 51.25 *per cent* in G 15 grade coal). Hence, if SCCL supplies G-15 grade only, the ash content of the coal will be more than the design limit of 26 *per cent* and TANGEDCO may end up in importing more quantity of coal

⁶¹ Scheme for harnessing and allocating coal transportation.

with consequent additional expenditure apart from affecting boiler and environmental issues.

The Government replied (January 2025) that in spite of recommendation of the Ministry of Power for G-13 grade of coal, the Ministry of Coal/Standing Linkage Committee allotted only G-15 grade for the entire quantity of requirement. Hence, TANGEDCO had to accept the grade which was beyond its control. It was also added that in order to meet the demand for electricity, the coal consumers have to use the coal supplied by coal companies as they are monopolies.

The reply cannot be accepted as TANGEDCO did not take any effort to insist the supplier to fix the quantities of each grade as these two supercritical projects require high grade coal.

4.4.2 Coal Block Allocation for ETPS Expansion, Ennore SEZ and Udangudi STPP

TANGEDCO executed (March 2016) the Coal Block Development and Production Agreement (CBDPA) with MoC for the allotted (February 2016) Chandrabila Coal Block for end use of the remaining three ongoing Thermal Power Stations *viz.* ETPS Expansion, Ennore SEZ and Udangudi. As per the agreement, TANGEDCO has to complete the development activities as per timeline and start production within 66 months from the date of Agreement (i.e., before September 2021). Out of total area of 9.320 square kilometres (sq. km.), 5.680 sq. km. (61 *per cent*) was non-forest area (600 MT of Coal is available in the non-forest area. Scrutiny of related documents in this regard revealed that the MOEF did not agree (February 2019) to the exploration under the forest area. Hence, TANGEDCO requested (October 2023) for surrender of the mine and release of the BG.

The Government replied (January 2025) that TANGEDCO was serious in developing the coal block and invited tender for fixing contractor for developing the whole coal block in anticipation of forest clearance. However, due to the recommendation of Scrutiny Committee/MoC, TANGEDCO was forced to surrender the coal block.

The reply is not acceptable as MoC had advised TANGEDCO to take up the progress of non-forest area of the block initially and pursue simultaneously for clearance to explore the forest area. However, without proceeding as advised by MoC, TANGEDCO surrendered the block there by losing the opportunity of availability of coal for the upcoming thermal power plants which are nearing completion (the progress of Ennore SEZ was 69 *per cent* and Udangudi was 82 *per cent* as of March 2024).

4.5 Compliance to Environmental Norms

Electricity is a clean form of energy at the consumption stage. However, the process of generating electricity involves depletion of natural resources combined with environmental pollution amongst other drawbacks. To minimise the adverse impact on the environment, the Ministry of Environment, Forest and Climate Change (MOEF&CC), GOI and Central Pollution Control Board are vested with powers and various statutes. At the State level, Tamil Nadu Pollution Control Board (TNPCB) is the regulating agency to ensure compliance with the provisions of these Acts and statutes.

Thermal and Gas fuelled Power Generating Plants have been classified under Red Category (by TNPCB) requiring continuous monitoring whereas the Hydro Power Plants are classified under Green Category.

Audit examined the efforts made by the management of TANGEDCO to reduce the pollution levels and comply with the pollution control norms during the period from April 2018 to March 2023 and the findings are discussed in the following paragraphs.

4.5.1 Operation of plants without consent of TNPCB

Under Section 21 of the Air Act, 1981 and Section 25 of the Water Act, 1974 and Rules made thereunder, the TNPCB was empowered to issue Consent to Operate (CTO) of the plants with respect to Air, Water, Noise and Hazardous Waste. The plants were required to annually renew their CTOs before its expiry. In this regard, the details of CTO granted to MTPS-II and NCTPS-II during the review period are given in **Table 29** below:

Table 29: Details of consent given by TNPCB

Sl. No	TNPCB / pollution	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023	
		MTPS-II	NCTPS-II	MTPS-II	NCTPS-II	MTPS-II	NCTPS-II	MTPS-II	NCTPS-II	MTPS-II	NCTPS-II
1	CTO for Air	✓	✓	✓	✗	✓	✗	✓	✗	✗	✓
2	CTO for Water	✓	✓	✓	✗	✓	✗	✓	✗	✗	✓
3	Noise	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓
4	Hazardous waste	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓

Source: Details provided by TANGEDCO

Note: ✓ indicates CTO obtained period and ✗ indicates CTO not obtained

It was noticed that MTPS-II has obtained all consents up to 2021-22 and the application for renewal of consent in respect of Air and Water which were applied in March 2022 is yet to be approved (March 2024). In respect of NCTPS-II, CTO could not be obtained for Air and Water for three years (2019-20 to 2021-22) due to National Green Tribunal (NGT) case. However, the same was granted for 2022-23. CTO is mandatory for all power stations and operation without CTO is violation and will attract penalty from PCB/NGT. Thus, TANGEDCO was operating the plant during three years without the mandatory consent of TNPCB.

4.5.2 Water Pollution

The power plants use water from water sources to cool their equipment and then release high-temperature water back into the same ecosystem. This poses a serious threat to aquatic ecosystems (animals and plants), which may even lead to extinction of the species. In this regard it was seen that though TNPCB requires zero liquid discharge, the MTPS-II and NCTPS-II discharged 11,85, 968 m³ and 5,84,809 m³ into the river Cauvery and sea water (Bay of Bengal) respectively. It may also be mentioned that NGT imposed (2016) ₹20.58 crore for polluting the above water bodies which was paid by TANGEDCO (June 2020/December 2021).

Chapter – 5

CHAPTER -5

Gas Turbine Power Stations

The gas turbine power stations consumed excess gas on account of poor-quality of gas supplied by GAIL and resulted in avoidable excess expenditure.

TANGEDCO has not analysed the impact on the intra-day fluctuations in supply of gas by GAIL and failed to incorporate suitable clause in the agreement towards compensation.

Non-carrying out preventive maintenance as per the recommendations of OEM in GTPS resulted in avoidable loss of generation.

Non-achievement of desired parameters resulted in disallowance of energy charges by TNERC impacting non-recovery of generation cost through tariff and ended up with loss.

In a Gas Turbine Power Station (GTPS), ambient air¹ is compressed and consequently, its temperature rises. The hot air is used to burn the fuel (natural gas or a liquid fuel like Naptha), which rotates the gas turbine (GT) and drives the generator for production of electricity. The flue gas that exits is transferred to a Heat Recovery Steam Generator for producing steam to drive a steam turbine (ST) generator for further power generation. This combination of gas and steam cycle to generate electricity is called a “combined cycle gas turbine” plant.

TANGEDCO had commissioned six Gas based thermal power stations (four natural gas based, one aero-derivative type² and one naphtha based) between 1992 and 2008. The aero-derivative type power station at Narimanam (1992) didn't suit the grid condition and the plant was stopped in August 2000 since the Gas Turbines were beyond repair. The naphtha-based station at Basin Bridge (1996) has not been operated due to its high cost of generation.

5.1 Operational performance of Gas Turbine Power Stations

Two power stations (out of five GTPSs in operation) viz., Kuttalam Gas Turbine Power Station (KGTPS) commissioned in March 2004 with 101 MW capacity (64 MW GTG and 37 MW STG) and Valuthur Gas Turbine Power Station (VGTPS-II) commissioned in August 2008 with 92 MW capacity (58.50 MW GTG and 33.70 MW STG) were selected for detailed audit.

5.1.1 Shortfall in generation due to under utilisation of capacity

The normative PLF to be achieved by the GTPSs was fixed as 70 per cent ie., 5,923.50 MUs (for the five-year period ended 2022-23). However, the power stations were able to generate only 4,439.66 MUs of power only during the

¹ Ambient air represents the atmospheric air in its natural state.

² The technology of an aero-derivative type gas turbine is derived from an aircraft turbine.

review period which resulted in a net shortfall of 1,483.84 MUs as shown in the following **Table 30** below:

Table 30: Shortfall in generation by the gas turbine power stations

Particulars/ Year	KGTPS					VGTPS				
	2018-19	2019-20	2020-21	2021-22	2022-23	2018-19	2019-20	2020-21	2021-22	2022-23
Possible Generation at full capacity (MUs)	884.76	884.76	884.76	884.76	884.76	807.67	807.67	807.67	807.67	807.67
Possible generation at 70 per cent PLF (MUs)	619.33	619.33	619.33	619.33	619.33	565.37	565.37	565.37	565.37	565.37
Gross Generation (MUs)	410.26	133.81	489.91	361.90	548.93	586.39	571.05	539.83	450.40	347.18
- GTG	245.57	83.05	322.46	311.95	392.95	401.01	387.11	368.91	301.09	237.95
- STG	164.69	50.76	167.45	49.94	155.97	185.38	183.94	170.92	149.30	109.23
Auxiliary Generation (MUs)	42.68	12.40	38.28	33.27	38.78	37.18	35.58	36.71	36.35	28.30
Net Generation (MUs)	367.58	121.41	451.63	328.63	510.15	549.21	535.47	503.12	414.05	318.88
Shortfall in generation ³	209.07	485.52	129.42	257.43	70.4	-	-	25.54	114.97	218.19

Source: Details provided by TANGEDCO

Detailed analysis of shortfall in power stations selected for review revealed that the GTPSs failed to achieve the normative generation and the deficit was 25 per cent (average) in these years, due to low PLF, forced outages and higher auxiliary consumption as discussed in the succeeding paragraphs.

5.1.1.1 Low Plant Load Factor

The line-graph depicting the PLF achieved by the power stations during the five year period (2018-19 to 2022-23) is given in **Chart 8** below:

Chart 8: PLF – Norm vs Actual (in percentage)



Source: Details provided by TANGEDCO

³ Shortfall when compared to normative PLF of 70 per cent.

Against the target of 70 *per cent* PLF, the power stations achieved only between 15.08 and 62.04 *per cent* (KGTPS) and between 42.99 and 72.60 *per cent* (VGTPS-II) in respective years.

It was observed from the records that the major reasons for the low PLF were low plant availability due to short supply of gas, major shutdowns and delays in repairs and maintenance.

The Government agreed (January 2025) that it could not achieve PLF fixed by TNERC due to short supply of gas than the committed quantity.

5.1.1.2 Auxiliary consumption of power

Energy consumed by power stations themselves for running their equipment and common services is called Auxiliary Consumption. TNERC has fixed the norms for auxiliary consumption as six *per cent* for GTPSs. The actual auxiliary consumption of the power stations was more than the norm resulting in non-availability of 464.34 MU of power for sale (costing ₹1,569.72 crore) as detailed in **Table 31** below:

Table 31: Details of auxiliary consumption in respect of GTPSs

Particulars/ Year	KGTPS					VGTPS				
	2018-19	2019-20	2020-21	2021-22	2022-23	2018-19	2019-20	2020-21	2021-22	2022-23
Gross Generation (MUs)	410.26	133.81	489.91	361.90	548.93	586.39	571.05	539.83	450.40	347.18
Auxiliary Generation (MUs)	42.68	12.40	38.28	33.27	38.78	37.18	35.58	36.71	36.35	28.30
Net Generation (MUs)	367.58	121.41	451.63	328.63	510.15	549.21	535.47	503.12	414.05	318.88
Auxiliary consumption (<i>per cent</i>)	10.40	9.27	7.81	9.19	7.06	6.34	6.23	6.80	8.07	8.15
Excess over the norm (<i>per cent</i>)	4.40	3.27	1.81	3.19	1.06	0.34	0.23	0.80	2.07	2.15
Excess auxiliary consumption (MUs)	18.05	43.76	88.67	11.54	58.19	19.94	13.13	43.19	93.23	74.64
Variable cost (₹ per unit)	3.13	2.83	1.84	3.07	6.66	2.36	2.55	2.20	1.82	6.13
Additional cost incurred (₹ in crore)	56.44	124.02	163.51	35.43	387.55	47.06	33.48	95.02	169.68	457.54

Source: Details provided by TANGEDCO

The auxiliaries continue to run and consume power even though the unit is shut down. It was noticed that the auxiliary consumption in excess of norms in the two power stations was attributable to excessive forced shutdowns, frequent trippings of the generating units due to mechanical defects which led to frequent startups, taking minimum period of five to six hours to attain maximum generation, during which period the auxiliaries were required to be maintained in normal working condition. Though the plants did not achieve the relaxed norm fixed by TNERC for auxiliary consumption, TANGEDCO had not taken any remedial measures to control the auxiliary consumption within the norms.

TANGEDCO failed to approach TNERC to fix the norm for auxiliary consumption in units instead of a percentage, since the plants could not operate at optimum PLF to achieve the norm prescribed by TNERC.

5.1.1.3 Forced Outages

Outages refer to the period for which the plant remained closed for attending to planned/forced maintenance. The position of the total available hours, hours operated and loss of generation due to forced outages in respect of GTPSs is given in **Table 32** below.

Table 32: Details of loss of generation due to forced outages

Particulars/ Year	KGTPS					VGTPS				
	2018-19	2019-20	2020-21	2021-22	2022-23	2018-19	2019-20	2020-21	2021-22	2022-23
Total available hours	8760	8784	8760	8760	8760	8760	8784	8760	8760	8760
Total operated hours	8146	2505	7729	8674	8175	8062	7817	8110	7920	6162
Forced outage hours	270	3	1030	85	143	292	358	106	211	218
Loss of generation due to forced outages (MUs)	9.00	0.17	44.73	2.33	8.01	27	33.09	9.79	19.48	20.16
Additional expenditure incurred ⁴ (₹ in crore)	17.30	0.39	172.47	6.65	2.40	73	84.88	34.26	79.93	16.65

Source: Details provided by TANGEDCO

Scrutiny of records in respect of forced outages revealed that during the review period, the Gas Turbine Generator (GTG) of KGTPS was under forced outages for 1,533 hours, of which 209 hours were due to electrical problem and 1,324 hours due to mechanical problem. The major outages occurred on account of avoidable causes viz., grid disturbances, failure and consequent delay in rectification of power transformer, rotor earth fault, etc. Similarly, in respect of VGTPS II, the GTG was under forced shutdown for 1,163 hours due to avoidable issues like surge protection, voltage dips, high turbine exhaust temperature, etc. Consequently, the power stations incurred loss of generation to the extent of 173.76 MUs, impacting additional expenditure of ₹487.58 crore to TANGEDCO towards purchase of power at higher cost.

5.2 Fuel Management

The gas power stations entered (December 2015/July 2021) into Gas Supply Agreement with GAIL to receive and purchase natural gas as the fuel for running of gas-based power stations. The agreement had been renewed periodically. GAIL would inform the plant the daily nominated quantity of gas to be supplied for 24-hour period (6 am to 6 am) on the previous day. The daily nominated quantity is aggregated annually.

⁴ Considering the difference between variable cost and average power purchase cost.

5.2.1 Excess consumption of gas due to higher Station Heat Rate

The agreements with GAIL provided for payment for supply of gas based on a net calorific value of 10,000 Kcal/SCM⁵ which was also adopted by TNERC for tariff determination. However, audit noticed that the gas supplied during the five-year period ending March 2023 was with lesser calorific value (ranging from 9,155 Kcal/SCM to 9,715 Kcal/SCM). This led to higher SHR (ranging from 1,996 Kcal/kwh to 2,773.00 Kcal/kwh in respect of KGTPS and from 1,886 Kcal/kwh to 2,356 Kcal/kwh in respect of VGTPS-II as against the designed SHR of 1,868 Kcal/kwh and 1,676 Kcal/kwh respectively) with consequent excess consumption of gas. The **Table 33** below indicates gas consumed, actual cost of gas, specific gas consumption allowed as per norms and the resultant loss on this account.

Table 33: Loss due to excess consumption of gas

Year	Generation (MU)	Quantity of gas consumed (SCM)	Cost of Gas consumed (₹ crore)	Cost of Gas consumed per SCM (₹)	Specific Gas Consumption (SCM)	SGC Norm (SCM)	Excess Gas Consumed (SCM)	Loss (₹ crore)
(1)	(2)	(3)	(4)	(5) (4)/(3)	(6)	(7)	(8) [(6)-(7)] *(2)	(9) [(2) *(8)]
KGTPS								
2018-19	410.260	96007700	102.25	10.65	0.2340	0.187	19.28	20.54
2019-20	133.805	30453100	34.41	11.30	0.2276	0.187	5.43	6.14
2020-21	489.908	103757200	83.32	8.03	0.2118	0.187	12.15	9.76
2021-22	361.808	106363800	101.05	9.50	0.2940	0.187	38.71	36.78
2022-23	548.925	120551600	339.59	28.17	0.2196	0.187	17.89	50.41
Total							93.47	123.62
VGTPS								
2018-19	586.388	127956000	134.61	10.52	0.2182	0.168	29.44	30.97
2019-20	571.051	123079000	141.18	11.47	0.2155	0.168	27.12	31.11
2020-21	539.827	114600000	89.96	7.85	0.2123	0.168	23.91	18.77
2021-22	450.396	105553000	93.52	8.86	0.2344	0.168	29.91	26.5
2022-23	347.178	83086000	219.93	26.47	0.2393	0.168	24.75	65.52
Total							135.14	172.87
Grand Total							228.61	296.49

Source: Details provided by TANGEDCO
SCM represents 'Standard Cubic Meter'.

Audit scrutiny revealed that the GTPSs consumed gas ranged between 0.2118 and 0.2940 scm/kwh during these years against the norm of 0.187 and 0.168 scm/kwh respectively for KGTPS & VGTPS-II. This has resulted in excess consumption of gas to the tune of 228.61 SCM valuing ₹296.49 crore.

5.2.2 Loss of generation coupled with additional expenditure due to inadequate supply of gas

KGTPS and VGTPS have entered contracts with GAIL for supply of 4,50,000 SCM⁶ per day (KGTPS) and 8,88,000 SCM per day (VGTPS). Scrutiny revealed that GAIL was not supplying the agreed quantum of gas during the audit period and consequently, both the power stations could not generate the desired energy and incurred loss of generation of 181.62 MUs coupled with

⁵ Kcal/SCM – Kilo Calories per Standard Cubic Metre.

⁶ Standard Cubic Meters

additional expenditure to the tune of ₹44.70 crore on account of purchase of power at higher cost as detailed in **Annexure 14**.

It could be seen from the above that the shortage in supply of gas varied between 26.06 *per cent* and 81.46 *per cent* in respect of KGTPS and 19.96 *per cent* and 48.03 *per cent* in respect of VGTPS-II.

As per the terms of agreement with GAIL for gas supply, both KGTPS and VGTPS-II had to pay for actual quantity of gas supplied subject to a minimum agreed quantity (known as minimum guarantee off-take (MGO)) which is 90 *per cent* of the adjusted annual contracted quantity. However, it was observed that there was no reciprocal clause for payment of any penalty by GAIL in the event of its failure to supply gas as committed in the agreement. Scrutiny of records revealed that an amount of ₹71.52 crore claimed by GAIL during the period from 2020-21 to 2022-23 on account of MGO in respect of VGTPS II was also paid by the power station. However, no penalty for short supply of gas could be levied on GAIL due to absence of specific clause in the agreement. Thus, the TANGEDCO failed to safeguard their interest by not insisting on incorporating a penalty clause for the same and would continue to incur such liability until such inequitable clauses in the agreement are not changed.

5.2.3 Failure to address the fluctuations in intra-day gas supplied by GAIL resulted in avoidable forced outages

GAIL has the right to nominate the Daily Nominated Quantity (DNQ)⁷ of gas, to be supplied on day-to-day basis which shall be the final quantity for that day. For this purpose, GAIL has to inform the power station, the DNQ of gas to be supplied from 6:00 hrs to 6:00 hrs (24-hour period) of a particular day, latest by 22:00 hrs of the previous day.

Audit independently reviewed the logbooks at KGTPS⁸ and noticed that during the course of the day, GAIL had been increasing/ decreasing the percentage of gas flow by intimating the power station five minutes before the start of the next hour orally. The abstract of number of changes made within a day during the period 2018-19 to 2022-23 is given in **Table 34** below:

Table 34: Details of Abstract of number of changes made within a day

Year	Number of occurrences (days)						Total
	Under outage	No change in a day	2-3	4-6	7-9	10-12	
2018-19	14	77	98	136	36	4	365
2019-20	261	0	27	66	12	0	366
2020-21	0	108	127	121	9	0	365
2021-22	1	83	147	122	12	0	365
2022-23	19	47	115	150	32	2	365
Total	295	315	514	595	101	6	1826
Percentage	16	17	28	33	6	0	100

Source: Details provided by TANGEDCO

⁷ DNQ is the quantity in which the seller informs to the buyer every day that he intends to supply for next day.

⁸ In VGTPS, no such records are maintained.

Out of 1,826 days, the station was not operated for 295 days (16 *per cent*) due to forced outages and no change in flow of gas for 315 days (17 *per cent*). In the remaining 1,216 days (67 *per cent*), changes were made by GAIL (ranging between 2 and 12 times) in the flow of gas. This resulted in not only affecting the health of the machineries but also ended up with loss of generation by way of operation at partial load.

The Government replied (January 2025) that GAIL was requested to avoid fluctuations in gas supply to ensure maximum generation. However, the fact remains that TANGEDCO failed to analyse the impact of the fluctuations in its financial interest and also failed to incorporate penalty clause in the agreement to avoid such fluctuations.

5.3 Repairs and Maintenance (R&M)

To ensure long term sustainable levels of performance, it is important to adhere to periodic maintenance schedules. The efficiency and availability of equipment is dependent on the strict adherence to annual maintenance and equipment overhauling schedules. Non-adherence to schedule carries a risk of the equipment consuming more fuel and increases risk of forced outages which necessitate undertaking of R&M works. These factors lead to increase in the cost of power generation due to reduced availability of equipment which would adversely affect the total power generated.

A significant instance in KGTPS where proper maintenance schedules were not adhered to which resulted in loss of generation is detailed below:

5.3.1 Non-adherence to OEM recommendations resulted in failure of transformer

In GTPSs, the power generated from turbines in magnitude of 11 KV is stepped up to 110 KV level and evacuated. KGTPS was equipped with two GTs of 90 MVA and 50 MVA capacities for stepping up of power generated from GT and ST side.

The 90 MVA generating transformer tripped (May 2017) due to technical problems and consequently, the generators could not generate power. An old/sick 63 MVA generating transformer which was in service for more than 50 years at Ennore Thermal Power Station was allotted to KGTPS and was re-commissioned (May 2017) in place of failed 90 MVA transformer and generation resumed.

TANGEDCO took more than 13 months to finalize and award the tender for repairing the 90 MVA transformer. The work order for complete rectification of the defective three phase 90 MVA transformer was awarded (August 2018) and the rectified 90 MVA transformer (at a cost of ₹1.57 crore) was erected and synchronized in December 2018.

As per the OEM recommendation, it is mandatory to carry out the major inspection in the on-load tap-changer (OLTC) mechanism once in five years or 10,000 operating hours whichever is earlier. It was noticed that the prescribed inspection was not carried out even though the operated hours

reached 20,000 and crossed 14 years (03 March 2017). Failure to conduct periodical maintenance led to the failure of 90 MVA transformer.

It was further noticed that frequent oil leakages in the replaced 63 MVA transformer restricted the operational performance of GTG. The power station, based on the guidance (November 2017) of the R&D wing, had to keep GT constant at around 27 MW and ST at 19 MW as against 64 MW and 37 MW respectively.

Thus, the station could generate 46 MW only, as against 86 MW⁹ for 567 days (26 May 2017 to 13 December 2018), when the 63 MVA transformer was in service and the consequent loss of generation on this account worked out to 544.32 MU¹⁰ amounting to ₹104.51 crore towards purchase of power at higher cost to compensate the loss of generation.

The Government replied (January 2025) that the failure of transformer was rare and unpredictable and not attributable to TANGEDCO. However, the fact remained that TANGEDCO failed to carry out the mandatory major inspection as recommended by the OEM which led to failure of transformer and has not shown interest for rectifying the failed transformer immediately to avoid loss of interest.

5.4 Financial performance of Gas Turbine Power Stations

The financial performance of the gas turbine power stations is fully dependent on the cost of gas supplied. The variable cost of gas turbine power stations is normally cheaper when compared to thermal power stations. However, during 2022-23, the cost of the gas was increased by the supplier and resulted in higher variable cost during the year.

5.4.1 Disallowance of energy charges by TNERC

TANGEDCO has submitted the comparison of actual operational performance parameters of generation functions like PAF, PLF, SHR, Auxiliary Consumption, etc., achieved during the respective years in order to derive variable cost of own generation, vis-a-vis operational performance parameters approved by the Commission in its Tariff Orders. TANGEDCO had justified the deviations considering the age of plants, design constraints, backing down instructions received from SLDC, etc. Considering all the factors along with the submitted justifications, TNERC has approved the plant-wise variable cost based on operational parameters and fuel related parameters and disallowed certain portion of claim which occurred on account of controllable factors like forced outages, avoidable repairs, etc., as shown in the **Table 35** below:

⁹ Maximum generation reached so far : GTG – 57 MW; STG – 29 MW (total – 86 MW).
¹⁰ 567 days x 24 hours x 40 MW/1000 = 544.32 MUs

Table 35: Energy charges claimed by TANGEDCO and allowed by TNERC

(₹ in crore)								
Year/ Power Stations	KGTPS				VGTPS-II			
	Generation (MUs)	Claimed	Disallowed	Net Loss (₹ crore)	Generation (MUs)	Claimed	Disallowed	Net Loss (₹ crore)
2018-19	367.58	3.71	0.83	30.51	549.21	2.34	0.26	14.28
2019-20	121.41	4.02	0.29	3.52	535.47	2.56	-	-
2020-21	451.63	3.15	0.30	13.55	503.12	1.71	0.02	1.01
2021-22	328.63	2.76	0.25	8.22	414.05	1.99	0.02	0.83
2022-23	510.15	6.02	0.07	3.57	318.88	5.63	0.03	0.96
Total loss (KGTPS)				59.37	Total loss (VGTPS)			17.07
Grand total (KGTPS and VGTPS-II)								76.44

Source: True-up orders of TNERC for the respective years.

On account of disallowance of variable cost and consequent energy charges, TANGEDCO could not claim ₹76.44 crore through tariff (in respect of KGTPS and VGTPS-II) and ended up with loss to that extent during the review period.

Recommendations:

TANGEDCO should:

1. Take up the issue of quantity and quality constraints in supply of gas with GAIL to avoid additional expenditures and amend the agreement accordingly;
2. Incorporate appropriate clause regarding penalty in the agreement with GAIL towards short supply of gas and intra-day fluctuations in supply of gas; and
3. Address its planned outages comprehensively so that frequent shutdowns are minimised by taking care of mechanical defects of the machineries and going for preventive maintenances. This will reduce the auxiliary consumption and ensure operating its plants within the TNERC norms.

Chapter – 6

CHAPTER- 6

NON-CONVENTIONAL ENERGY SOURCES

TANGEDCO failed to complete the RMU works in two of its existing hydro power stations and desilting works in two dams and lost the opportunity to increase its share of non-conventional energy.

The two hydro projects under execution were not completed in scheduled time resulting in postponing of envisaged benefits.

Failure to implement the solar park by utilising the financial assistance extended by MNRE had resulted in forgone savings on account of purchase of power from private power producers.

Even though the private Wind Power Generators had repowered many of their life served wind turbines, TANGEDCO failed to repower its own wind turbines which served more than the normal useful life.

6.1 Hydro Power Stations

The total installed capacity of hydro power stations was 46,850.15 MW in the country (March 2023) comprising 211 power stations with 729 units. This comprises of Central (33 per cent), State (58 per cent) and private (9 per cent) sectors. In Tamil Nadu, the entire State's hydro capacity of 2,321.90 MW (47 Hydro Power Stations) is owned by TANGEDCO. Out of 47 Hydro Power Stations, 29 Power Stations (891.25 MW) were irrigation based and the remaining 18 stations (1,430.65 MW) were non-irrigation based. The generation out of these power stations varied between 4,964 MUs and 6,174 MUs during the audit period.

6.1.1 Renovation, Modernisation and uprating

Out of 47 hydro power stations, 16 hydro power stations have completed the normative life of 35 years, and Life Extension Programme (LEP) which should have been taken prior to normative life is yet to be taken up in these power stations. However, Renovation Modernisation and Uprating (RMU) programme was completed in five power stations¹ (between 1994 and 2019) and being implemented in two hydro stations, viz., Moyar and Kodayar-I during the audit period.

Kodayar Powerhouse – I (KPH-I) was commissioned (December 1970) with one unit of 60 MW and has been in operation for over 50 years. The long course of operation has caused much deterioration of many vital components/systems of the turbines and generators. The efficiency of the unit has deteriorated considerably and has been operated at a derated capacity of 45 MW for more than 13 years. Resultantly, TANGEDCO has been losing 131.40 MUs of power every year.

¹ Pykara (1994), Papanasam (2004 to 2005), Mettur Dam (2004 to 2006), Periyar (2009-2016) and Sholayar (2015 to 2019)

Moyar Power-House (MPH) was commissioned during 1952-53 with three Units of 12 MW each. Since the life of the Units had crossed more than 50 years, the units were operated at a derated capacity of 9 MW per unit only thereby losing 78.84 MUs² annually.

Hence, an urgent need was felt to suitably renovate the above plants in order to obtain the desired output over an extended life at par with new machines through new improved design by carrying out RMU work in the units. The deficiencies noticed in planning/execution of the proposed RMU works are explained below:

6.1.1.1 Delay in renovation, modernization and uprating works at Kodayar Power House I

The unit has been facing operational issues viz., failure of runners, turbine guide bearing, governor and stator coil since its commissioning. Hence, the unit was being operated at derated capacity from 2010 onwards because of high temperature of thrust bearing and higher vibration. No RMU work has taken place since commissioning of the Unit, as against the norm of once in 30 to 35 years by Central Electricity Authority (CEA).

The consultant (M/s. MECON) recommended (March 2015) for RMU of the plant and administrative approval for RMU work was accorded (February 2017). The LOI was awarded (March 2020) to BHEL at a total contract price of ₹80.96 crore with period of completion of 32 months.

BHEL completed (August 2021) the work of reverse engineering and submitted (June 2022) only 91 out of 350 drawings for approval. The due date for submission of drawings and supply of materials expired in January 2022 and January 2023 respectively. However, BHEL has neither submitted the full drawings nor supplied the materials till date (March 2024). Further, BHEL did not come forward to take over the Unit for RMU work (from January 2023) even though TANGEDCO was ready to hand over the same. Subsequently, when BHEL consented (November 2023) to take over the Unit, TANGEDCO was not in a position to hand over since TANGEDCO was generating power using the Kodayar dam water. After depleting the dam water, TANGEDCO once again requested (May 2024) to take over the Unit whereas BHEL has taken over the Unit only in August 2024. The work is under progress (December 2024).

In this connection, Audit observed that the Unit has been operated at 45 MW capacity as against 60 MW capacity for more than 13 years and the delay has caused not only loss of generation of 131.40 MUs per annum³ (657 MUs during the review period), but also purchase of power at higher cost.

The Government replied (January 2025) that BHEL had supplied 40 *per cent* of materials so far and consequent to repeated discussions with them, the Unit was taken up (August 2024) for RMU works. It was also stated that the dismantling work is in progress and an amount of ₹12.99 crore was paid till date. It was also added that an amount of ₹5.24 crore was recovered as LD for the delay.

² 3 Units * 3 MW * 24 * 365

³ 15 MW (60 MW – 45 MW) x 1000 x 24 x 365 days/10,00,000

The reply is to be viewed on the fact that the contractor has taken the Unit for RMU works after a lapse of three years from the date of reverse engineering work and the plant has been operated with lesser capacity. Further, due to the delay, TANGEDCO had to purchase power at higher cost and the loss on this score worked out to ₹43.23 crore⁴ for one year alone.

6.1.1.2 Improper planning in carrying out RMU works at Moyar power house

TANGEDCO engaged (June 2013) M/s MECON (consultant) to carry out the Residual Life Assessment (RLA) study who in turn reported (September 2013) that the machineries may fail any time due to aging and recommended for RMU. Even though the Board of Directors of TANGEDCO (Board) approved (June 2016) the proposal for RMU of Moyar Power House (MPH) from 3x12 MW to 3x14 MW in May 2016, the LOI for RMU was issued only in November 2019 to M/s Andritz Hydro Private Limited for ₹121.13 crore. Unit II of MPH was handed over (January 2020) to the contractor for Reverse Engineering and after receiving back the same (December 2020), Unit I was handed over (March 2022) for RMU works.

The contractor should have completed the RMU works of both units in March/December 2023. Further, the contractor had to commence supply of materials for second unit after completing the RMU of first unit whereas, he had supplied materials worth ₹17.32 crore for second unit before completing the RMU of first unit and ₹14.72 crore was also paid.

In this connection, Audit observed that:

- TNEB Hydro Manual insists for periodical checking of expansion joints for leak, anchors for cracks and joints for corrosion. Though the consultant suggested for replacement of leaking rivets based on RLA long back (2014), TANGEDCO failed to incorporate the scope of replacement of penstocks along with the RMU of the main equipment.
- The DPR for the work was prepared (February 2015) and the tender was finalised (March 2018) after conducting several meetings with Standing Committee members and the tender was floated (July 2018). Further, the tender was finalised and LOI was issued in November 2019 whereas the work contract was issued in September 2021 only. Thus, TANGEDCO took 42 months to issue LOI from the date of approval of the Board and another 21 months for placing work order. Though the replacement of entire stretch of three penstocks was proposed to be completed in 32 months, TANGEDCO is yet to commence the tendering process (March 2024).

Presently, TANGEDCO could generate only 9 MW per Unit with the same quantity of water (required for generating 12 MW). Had the RMU been completed in time, the Unit could have been operated at the desired capacity of 14 MW per Unit which would have resulted in additional generation of

⁴ LOG – 131 MUs p.a.; Average power purchase cost (2022-23) - ₹6.96 per unit; Average own generation cost - ₹3.66 per unit; Additional expenditure = 131 MUs * (₹6.96-₹3.66) = ₹43.23 crore.

131.40 MUs⁵ per annum (657 MUs during the review period) amounting to ₹43.23 crore.

The Government replied (January 2025) that due to aging of machines, MPH had been generating only 9 MW. Further, it was stated that RMU work was completed (October 2024) in one Unit and is in trial run. It was also stated that the other Units will be handed over for RMU after taking over the first Unit by TANGEDCO.

Thus, delay in furnishing the drawings and non-supply of required materials in time by the contractor apart from failure to include a clause as recommended by the consultant and systematic delays by TANGEDCO in award of tenders resulted in forgone generation of 262.80 MUs per annum in respect of the above two RMU works.

6.1.2 Dam Rehabilitation and Improvement Project

GOI, with an objective to improve safety and operational performance of selected dams, embarked upon (April 2012) Dam Rehabilitation and Improvement Project (DRIP) with world bank assistance of ₹2,100 crore which was revised to ₹3,466 crore (September 2018). DRIP was proposed as a six-year project and the works were to be executed in four phases of 18 months. The large dams (38 numbers) of TANGEDCO which required rehabilitation and improvements were included in DRIP.

GoTN accorded (November 2010) administrative sanction for implementation of DRIP with World Bank assistance in the State at total cost of ₹745.49 crore, of which ₹260.14 crore was provided for large dams of TANGEDCO. Two such DRIP works were planned for implementation during the audit period and the discrepancies noticed in these works are discussed below:

6.1.2.1 Failure to conduct proper study and take corrective action resulted in postponing of desilting work at Kundah Palam Dam

Kundah Palam Dam was one among the dams included in DRIP. It is mainly a storage reservoir, and forebay dam to Kundah Powerhouse-2, constructed during 1956-61. Audit noticed that the storage capacity of the dam is 17.60 lakh m³ and no de-silting work had been carried out till date (March 2024). The consultant (M/s Gradient) conducted the silt study during 2007 reported that the volume of silt deposited as 8.69 lakh m³ (55.68 *per cent* of the capacity of the dam). Meanwhile, TANGEDCO removed the silt through scour vent opening to the maximum extent and the balance silt deposited was estimated at 7.50 lakh m³. TANGEDCO estimated the loss of generation as ₹61.00 crore per year in the DPR due to accumulation of silt and consequent under-utilisation of dam water. The work of de-silting work was administratively approved (June 2016) and awarded (March 2017) for ₹18.18 crore with scheduled date of completion as 18 months.

TANGEDCO decided to dump the silt at TANGEDCO's own land measuring 6.00 acre and piece of revenue land (swamp land) measuring 1.61 acre which lies in the middle of TANGEDCO's land. Hence the concerned authorities objected dumping silt in the revenue land and TANGEDCO could not find alternate land. In the meantime, the District Collector permitted to dump 2 lakh

⁵ (5 MW x 3 units x 1000 units x 24 hours x 365 days)/1000000

m³ of silt by constructing retaining wall to protect the swamp land. However, without considering this, TANGEDCO cancelled the tender.

In this connection, Audit observed that TANGEDCO assured World Bank that necessary clearances would be obtained from all departments and land for dumping the silt would be demarcated before execution of work. Further, TANGEDCO addressed GoTN and GOI that the proposed land identified for dumping the silt belongs to TANGEDCO only. Hence, the work could not be executed as there was revenue land in the middle of TANGEDCO's land.

Thus, failure to conduct proper survey of land for dumping the silt and non-considering the suggestions of the district Collector (to desilt and dump 2 lakh m³) resulted in forgoing of revenue to the extent of ₹16.27 crore per annum⁶ and the total revenue forgone for four years from 2019-20 to 2022-23 worked out to ₹65.08 crore.

The Government replied (January 2025) that it was proposed to desilt 2 lakh cubic meter by open evacuation and dumping in TANGEDCO land by constructing a retaining wall around the swamp land. It was also stated that the work would be taken up after getting approval from World Bank.

However, the fact remains that the desilting work identified in 2007 itself could not be implemented despite lapse of 17 years. Further, TANGEDCO should have identified the land atleast before tendering the work. TANGEDCO's failure in this regard resulted in forgoing of additional benefits by way of yielding revenue.

6.1.2.2 Ineffective planning in awarding the work of excavation and desilting of Papanasam Diversion Weir

Papanasam diversion weir was constructed during 1939-44 across Tamarabarani river and the weir acts as a forebay for Papanasam powerhouse. Apart from its own catchment, the weir receives tail water discharges of Servalar powerhouse also. TANGEDCO assessed (2016) silt deposition of 8.37 lakh m³ (60 per cent of the dam's capacity) which hindered the continuous power generation and hence, it was proposed to desilt 4.50 lakh m³. This would result in (i) increasing storage capacity, (ii) both the Servalar powerhouse (1x20 MW) and Papanasam powerhouse (4x8 MW) can be operated continuously during peak hours by avoiding surplus water over diversion weir and (iii) quality of water would be improved resulting in lesser abrasion to the turbine blades.

TANGEDCO accorded (June 2016) approval for carrying out the DRIP work. The work of excavation/desilting of reservoir and allied works was awarded (April 2017) to a Joint Venture consortium for ₹13.26 crore and LOA was also issued (April 2017). However, the works could not be undertaken by consortium for want of clearance from forest department since the area in which the silt was being deposited lies inside the core area of tiger reserve.

In this case also, TANGEDCO failed to identify proper land for desilting before award of work and hence, it had cancelled the awarded contract. The Board Level Tender Committee (BLTC) has directed to go for retender after getting clearance from Forest Department. The World Bank also

⁶ ₹61 crore/7.50 lakh m³ x 2.00 lakh m³

recommended to take up the works under DRIP-II. TANGEDCO is yet (March 2024) to find out an alternate land and get clearance from Forest Department/GoTN.

The Government in its reply (January 2025) confirmed the observation and stated that the matter has been apprised to the Central Water Commission and the World Bank for suggesting further course of action for desilting of Papanasam Diversion Wier.

6.1.3 Capacity Addition in Hydro Power Projects

In the Vision document (2014), it was planned to implement five hydro-electric power projects⁷ whereas timeframe (2017/2018) was fixed for carrying out only three projects and the timeframe for the other two projects (Sillahalla Pumped Storage Project and Velimalai Pumped Storage Hydro Electric Project) was not finalised. Out of the three projects for which timeframe was fixed, TANGEDCO has undertaken only two projects (Kundah Pumped Storage Hydro Electric Project – 500 MW and Kollimalai Hydro Electric Project – 20 MW) for execution.

The scheduled date of commissioning as per the DPR of the projects was from November 2021 to May 2023 (Kundah) and April 2021 (Kollimalai). Both the hydro projects did not adhere to the milestone/scheduled date of completion which has resulted in avoidable purchase of power at higher cost to the extent of ₹1,278 crore⁸ (for one year alone) thus affecting the financials of TANGEDCO.

6.1.3.1 Kundah Pumped Storage Hydro-electric Project 500 MW (4x125MW)

TANGEDCO has already established six hydro power stations at Kundah (Kundah I to VI) and is executing its seventh hydro power station) in Kundah basin. Kundah Pumped Storage Hydro-electric Project (KPSHEP) is the second Pumped Storage Hydro Electric Power⁹ (PSHEP) Project in the State, taken up with the in-principle approval (June 2007) of GoTN aimed to produce three million units (MUs) per day (operating for six hours). All required clearances were obtained before September 2013. The private land required for the execution of the project had already been acquired (December 2008).

The execution work of the project was awarded through EPC Contracts in phases and packages between February 2018 and November 2019 as detailed in **Table 36** below:

⁷ Periyar Vaigai (30 MW), Kollimalai (20 MW), Kundah (500 MW), Sillahalla (2000 MW) and Velimalai (200 MW).

⁸ Generation from new projects was 3,871.92 MUs (520 MW) per annum (at 85 per cent PLF). Average power purchase cost during 2022-23 was ₹6.96 per unit and average generation cost was ₹3.66 per unit. Hence, additional expenditure worked out to ₹3.30 x 3,871.92 MUs = ₹1,278 crore.

⁹ Reservoirs (Upper and Lower) are connected with Tunnels and water is pumped up during off-peak time and used for generation during peak time.

Table 36: Details of EPC contracts awarded

Phase/ EPC Package	Awarded to	Nature of work	Amount as per LOI (₹ in crore)	LOI Date (Zero date)	Period of completion (months)	Scheduled date of Completion	Delay (months) up to March 2023
I/I	M/s. Patel Engg. Limited (PEL)	Civil	343.63	15.02.2018	48	14.02.2022	13
I/II	M/s.Kundah PSP Consortium (PSP)		338.75	15.02.2018	45	14.11.2021	16
I/III	M/s Megha Engineering and Infrastructure Limited (MEIL)	Electro-mechanical	604.62	28.11.2019	42	27.05.2023	NA*
II			756.54	28.11.2019	42	27.05.2023	NA*
III			401.85	28.11.2019	42	27.05.2023	NA*

Source: Details provided by TANGEDCO

**Note: NA mentioned because the scheduled date of completion falls beyond March 2023.*

The revised scheduled date of completion for all the phases is September 2025. The irregularities during the execution of the projects observed by Audit are explained in the following paragraphs.

6.1.3.2 Failure to obtain approval of Cauvery Basin States

TANGEDCO filed (October 2006) DPR of the Project with Central Electricity Authority (CEA) and Central Water Commission (CWC) of GOI for obtaining Techno Economic Clearance for project execution. CWC raised (December 2007) the interstate issue pointing that the project lies in the Cauvery Basin and hence clearance from Cauvery Water Dispute Tribunal (CWDT) or clearances from other Cauvery basin states *viz.*, Kerala, Karnataka and Puducherry had to be obtained¹⁰. Concurrence was given by the Government of Puducherry alone (June 2008) leaving Kerala and Karnataka.

TANGEDCO failed to take appropriate measures to approach Kerala and Karnataka to obtain their concurrence in 15 years' time period. Since the concurrence of the two Cauvery basin States was not obtained, Techno Economic Clearance for the project from CEA/GOI has not been obtained.

The Government stated (January 2025) that considering the essentiality of the project, execution was taken up with the approval of GoTN. However, the fact remains that TANGEDCO failed to obtain Techno-economic Clearance of GOI.

6.1.3.3 Splitting up of contract to obviate approval of GoI

The entire contract was split into three phases with a view to launch the project on ground expeditiously to avoid time and cost overrun. While awarding the project works under EPC Contract, the entire scope of Phase I was further split into three packages and Phase II and III. The cost increase proposal put up to GoTN for obtaining Revised Administrative Sanction (RAS) is given in **Table 37** below:

¹⁰ Cauvery River originates in Karnataka, flows through Tamil Nadu with major tributaries coming from Kerala and drains into the Bay of Bengal through Puducherry

Table 37: Details of cost increase proposal put up to Government
(₹in crore)

Phase	As per Government Order		As per TANGEDCO Board Proceeding		As per Revised proposal (November 2022)
	Amount	Date	Amount	Date	
I	488.48	03.12.2008	989.80	16.02.2015	1,949.35
II	498.58	29.04.2013	599.32	09.12.2015	955.42
III	229.53	20.06.2014	242.17	09.12.2015	496.23
Total	1,216.59		1,831.29		3,401.00

Source: Details provided by TANGEDCO

Audit observed that the project work was split up in such a way that GOI approval could be avoided¹¹. However, it was noticed that the total cost of Phase-I alone exceeded the power of the State Government (₹1,000 crore) by ₹949.35 crore and TANGEDCO is yet to obtain the RAS (March 2024). An amount of ₹2,334.38 crore has already been incurred by achieving mere 46 per cent (March 2024).

The Government replied (January 2025) that due to the absence of concurrence from co-basin States, it was proposed to take up execution by exercising the State powers. However, it was observed that the Phase-I cost of the project alone has exceeded the State Powers and TANGEDCO did not obtain either the approval of GOI or RAS from GoTN.

6.1.3.4 Failure to avail benefits of Mega Power Project

Mega Power Policy (1995) of MoP and its subsequent revisions/amendments, provided that developers of the Hydro Power Projects (installed capacity of 500 MW or above) were eligible for the benefit of duty-free import of capital equipment. Audit observed that though KPSHEP was eligible for the benefits under the policy, TANGEDCO failed to avail the same thereby reimbursing ₹5.11 crore paid (Customs Duty, Education Cess and IGST) for the Hydro Mechanical Equipments imported by the EPC Contractor, which could have been avoided.

The Government stated (January 2025) that the benefit could not be availed due to absence of Techno-economic Clearance. Thus, the failure to obtain Techno-economic Clearance of GOI has deprived TANGEDCO the benefit of Mega Power Project.

6.1.3.5 Deficiencies in Contract Management

Deficiencies were noticed in finalisation and award of contracts, execution of work, etc., as detailed below:

- **Violation to Bid Qualification Requirement:** One of the conditions mentioned in the Bid Qualification Requirement (BQR) in the tender floated for Packages I and II of Phase-I was that in case of consortium bidders, the members who take part in the tender under one consortium cannot be a member/associate in another consortium. However, as there was no such condition for an individual bidder to participate in individual capacity and/or as lead member of the consortium, Packages I and II were awarded (February 2018) to Patel Engineering Limited

¹¹ As per the Notification (April 2006) of GOI, MoP, for setting up hydro generating stations by any Company involving an estimated capital expenditure exceeding ₹500 crore (revised to ₹1,000 crore in January 2014) shall be submitted for concurrence of CEA.

(PEL) in individual capacity and as a lead member of the consortium respectively. Further, as per the BQR, a bidder who is undergoing Corporate Debt Restructuring (CDR)¹² was not eligible to participate in the bid. Though TANGEDCO was aware of the fact that the lenders turned part of ₹5,000 crore loans of PEL into equity through SDR, no due diligence was carried out to confirm the fact from the lenders.

It was also observed that PEL suffered loss during 2015-16 (latest period for bid evaluation) and the improper evaluation/assessment by TANGEDCO led to delay in execution of project as is evident from the fact that PEL repeatedly made requests to refund the Retention Amount and for enhanced payment (cost compensation) citing its financial status.

The Government stated (January 2025) that as per the BQR, the firms who have applied for CDR or BIFR during the past three years as on the date of submission of bid were not eligible to participate in the tender and based on this condition only, the contractor was selected. The reply is not tenable in view of the fact that the contractors could not mobilise men and material for both the packages as is evident from the claim for refund of retention amount. Further, TANGEDCO failed to incorporate BQR condition to evaluate the bidders participating in both the packages (in toto).

- **Avoidable carrying cost:** Electro-Mechanical works were to be carried out on completion of civil works. However, due to slow progress of civil works, machineries/materials mobilized by the Electromechanical contractor valuing ₹1,288.80 crore was lying idle (March 2024) which could not be put into beneficial use. Audit observed that TANGEDCO had incurred carrying cost¹³ to the tune of ₹117.26 crore¹⁴ till March 2024 due to *non-synchronising the Civil and Electromechanical EPC contracts* and non-execution of the civil EPC contracts on time.

The Government in its reply stated (January 2025) that due to non-execution of civil EPC works on time, the work front was not available for the E&M contractor whereas the E&M Contractor supplied the materials as per his Schedule. It is pertinent to note that TANGEDCO failed to revise its E&M schedule based on the progress of Civil works resulting in idling of materials and the consequent carrying cost.

¹² CDR involves restructuring the existing debt by increasing the repayment period or by reducing the rate of interest or by granting of fresh loans. Strategic Debt Restructuring (SDR) provides for conversion of debt into equity by the lenders. SDR is subsequent to CDR and is the second level of restructuring.

¹³ Cost incurred towards servicing of loan amount availed to honour the running account bills.

¹⁴ At the minimum interest rate of 10.50 per cent charged on the existing loans of KPSHEP

6.1.3.6 Payment of Cost Compensation to firm price Contractors

TANGEDCO approved (November 2023) cost compensation¹⁵ for Civil and Hydro-mechanical works to the tune of ₹102.96 crore¹⁶ (excluding GST of ₹18.53 crore), while the works of both the packages were still in progress (extension of time granted up to December 2024). Audit noticed that the EPC contracts were firm price contracts, and the contractors were not eligible for any additional claim during the scheduled period of contract. Further, in the negotiation meetings held (August 2017) by TANGEDCO also, both the EPC contractors (M/s. Patel Engineering Limited and M/s Kundah PSP consortium) had stated that their rates were arrived at by considering average escalation upto the completion of project from the estimated year (i.e.) for a further period of about six years. However, the cost compensation was approved in deviation to the contract condition and the contractors were unduly benefitted by ₹121.49 crore (₹36.81 crore for Package-I and ₹84.68 crore for Package-II).

The Government replied (January 2025) that extension of time was granted under force majeure conditions resulting in escalation of cost of materials, labour and fuel which was beyond the control of TANGEDCO as well as the contractors and hence compensated. However, it is pertinent to mention that even though EoT was granted for all the projects being carried out during the force majeure condition, only these EPC contractors were compensated on the said grounds. Further, it is also pertinent that the E&M Contractor who has to carry out his work subsequent to the civil works was not compensated for the same force majeure conditions. Moreover, in the event of providing cost compensation due to reasons not attributed to the contractors, this will become precedence for other contractors to cite this and demand the same.

6.1.3.7 Undue benefit to the contractor

TANGEDCO issued Project Essentiality Certificate (PEC) to the E&M Contractor for importing equipments to the tune of ₹107.04 crore (Cost Insurance Freight Value) based on his request (December 2020). However, Bill of Quantity (BOQ) indicated that all the components were indigenous components only. Issuing of PEC for indigenous supply has benefitted the Contractor to the tune of ₹5.35 crore (being the basic customs duty at concessional rate of five *per cent*) in its probable unauthorised usage (import of machineries for other Projects).

Further, the contract value for civil works (Package II of Phase I) included Customs Duty of ₹1.09 crore and IGST of ₹4.02 crore for imported item (steel plate for pressure shaft steel liner). However, Audit observed that the steel plates were procured indigenously and due to non-revision of the contract value factoring the above, payment of cost compensation was made unduly to the contractor to the extent of ₹1.28 crore (25 *per cent* of ₹5.11 crore).

The Government replied (January 2025) that the amount quoted in BOQ was only claimed by the contractor, which was paid by TANGEDCO and hence,

¹⁵ For increase in cost due to extension of timeline since the delay was attributed to TANGEDCO and not the contractor.

¹⁶ ₹31.20 crore for Package-I and ₹71.76 crore for Package-II. Package II includes ₹66.86 crore representing the escalation due to delay in finalization of pressure shaft design parameters.

there was no undue benefit to the contractor. Though there was no additional claim, the fact remains that the possibility of misuse of PEC could not be ruled out.

6.1.3.8 Non-adherence to conditions of Environmental Clearance

Implementation of plans included in the Environmental Impact Assessment (EIA) study would improve the conditions of the environment during and after the development of the project and bring in socio-economic development of the region. It was seen that the following conditions were yet to be complied by TANGEDCO (**KPSHEP**) (March 2024).

- Clearance from the Standing Committee of the National Board for Wildlife due to the Project location being within 10 kms from the Mukurthi National Park and the Mudumalai-Mukurthi Tiger Corridor.
- Measures under Environment Management Plan *viz.*, Greenbelt Development Plan, Forest Protection Plan, Wildlife Conservation Plan, Reservoir Rim Treatment Plan (planting of suitable tree species on the slopes of reservoir banks) and Fisheries Management Plan.

6.1.4 Kollimalai Hydro Electric Project

Kollimalai Hydro Electric Project (KHEP) situated in Kollimalai (Namakkal District) is a hill stream scheme of 20 MW envisaged by TANGEDCO to generate 71.23 MU annually based on GoTN's in-principle approval (September 1995). The Board of TANGEDCO accorded its approval for the Project in July 1997. All mandatory clearances were obtained before May 2009. The private land required for the execution of the project has not yet been fully acquired (December 2024).

The EPC contract was awarded to a consortium of four members in December 2016 with scheduled completion of April 2021 as detailed in **Table 38** below.

Table 38: List of EPC Contracts awarded (₹ in crore)

Name of the Contractor	Scope of work	Value of work (₹)		Original scheduled date of completion	Revised scheduled date of completion	Delay (months) up to March 2023
		Original	Revised			
		December 2016	October 2018			
K Rajagopal & Co	Civil	145.80	168.80	April 2021	October 2025	24
Sri Saravana Industries Pvt Ltd (SSIPL)	Electrical	40.19	45.40			
GMW Private Limited	Mechanical	67.50	76.48			
Hunan Allonward	Turbine and Generator	16.51	16.70			
Total		270.00	307.38			

Source: Details provided by TANGEDCO

It could be seen from the above table that the Project, which was planned to be commissioned by April 2021, could not be commissioned even after a delay of 4 years (March 2025). The revised target date of completion has now been fixed as October 2025. The Project could achieve 66 *per cent* only (March 2024). The contributing factors for the delay are discussed below:

6.1.4.1 Delay in Land Acquisition

For executing the project, various types of land viz., Forest, Temple, Poromboke (Government/River) and Patta/Private had to be acquired by TANGEDCO and the approved cost (December 2014) was ₹3.32 crore.

The details of the required land and the status of acquisition are given in **Table 39** below:

Table 39: Details of required land and Status of acquisition

Type of Land	Type of Acquisition	Area (hectare)	Date of clearance (Government Order No./ Date)	Date of handing over to EPC Contractor
Forest	Clearance	5.50.00	37/24.04.2008; Tree cutting – 22.05.2017	11.05.2018
HR & CE	Private Negotiations	3.04.00	207/26.09.2017; Enter Upon -10.05.2018	11.05.2018
Government Poromboke	Alienation	25.75.00	87/30.10.2019; Enter Upon – 09.12.2021	30.10.2016
River Poromboke	Alienation	35.13.00	149/03.10.2019 User permission (PWD)	No need to hand over
Patta/Private	Private Negotiations	18.21.25	60/10.11.2022	4.25 hectares handed over on 10.04.2023

Source: Details provided by TANGEDCO

The execution of the project has been delayed mainly because of delay in acquisition of patta and temple land as given below:

- Patta Land:** The requirement of Patta Land was assessed way back in 1996 when the DPR was prepared. However, the Land Plan Schedule was submitted in June 2012 only, after a lapse of over 15 years. After the enactment of Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act, 2013, GoTN issued (October 2019) administrative sanction for acquisition under the said Act. However, GoTN has given revised approval (November 2022) for acquiring the patta land under the Industrial Purposes Act, 1997. Due to the above delays of another 10 years (i.e. from June 2012), the cost of patta land has increased from ₹ 0.95 crore (January 2014) to ₹ 23.31 crore (August 2022).
- Temple Land:** The request for acquisition of 3.04.0 Hectare of land belonging to the Arappaleeswarar Temple was submitted to the HR & CE in February 2009, after a lapse of over 12 years (i.e. from July 1997). Approval from HR&CE was obtained in September 2017 and Enter-upon permission was obtained from the Temple Authorities in May 2018.

Though pre-entry permission for the Temple Land was obtained way back in May 2018, TANGEDCO addressed the HR&CE Department only in November 2020 for conducting public hearing. Mortgage Deed could not be executed till date (March 2024) in favour of M/s REC (against loan sanction agreement) due to non-execution of Sale Deed in favour of TANGEDCO.

As the above delays were attributable on the part of TANGEDCO, the contractor was granted extension of time without levy of LD till October 2025.

While accepting the fact, Government replied (January 2025) that extension of time for mortgage was sent to M/s REC for approval and action is being taken to register the Sale Deed for the Temple Land. It was also stated that approval for acquisition of patta land under Tamil Nadu Acquisition of Land for Industrial Purposes Act, 1997 was obtained in November 2022 only and site handed over to contractor subsequently.

6.1.4.2 Deficiencies in Tendering Process

Tenders were invited in January 2014 and works awarded in September 2016 to a consortium for ₹270.00 crore. The deficiencies relating to tendering which impacted the execution of the project is given below:

- **Non-grant of Extension of Time requested in pre-bid meeting**

In the tender invited (April 2012), there were pre-bid queries from 11 bidders and nine bidders requested for extension of time of one to three months which was not granted. Finally, only one bidder submitted the bid, and the tender was lodged since the rate quoted was on the higher side. In the subsequently finalised tender, five bidders participated and in the pre-bid meeting (February 2014), two bidders requested extension of time (15 days) for submission of bids. However, the request was denied on the ground that it was not feasible. Thus, the tender was finalised on single bid basis which eliminated the possibility of ensuring competitive bidding process and led to inability to claim Central Financial Assistance of the Ministry of New and Renewable Energy (MNRE).

The Government stated (January 2025) that extension of time was not granted considering the number of bidders attending the pre-bid meeting. The reply of the Government is not acceptable as even in the first tender invited in 2012, the number of bidders who raised queries, attended the pre-bid meeting, etc., were more as stated above, whereas only one bidder submitted the bid.

- **Violation of Tender Act/Rules in finalisation of tender**

The evaluation of tenders and award of contract shall be completed, as far as practicable, within the period for which the tenders are held valid as specified in the tender documents (the initial period of validity shall ordinarily be 90 days (Rule-14)). The total of extensions shall ordinarily not to exceed 180 days and in case the evaluation of tenders and award of contract is not completed within the extended validity period, all the tenders shall be deemed to have been invalid and fresh tenders should be called for (Rule-26). Against these provisions, TANGEDCO had taken 696 days¹⁷ to issue LOI to the successful bidder.

Government replied (January 2025) that the work was awarded following the due procedure and with approval of competent authority.

¹⁷ Price bid opening – 27.10.2014 and award of LOI – 21.9.2016.

The reply is not acceptable since the price bid opening was deferred (April 2014)¹⁸ seeking the status of various land required for executing the project. Further, committees to study hydrology, project cost and financial tie-up aspects was constituted in February 2015, after opening the price bid (October 2014) and also after two rounds of negotiations (November 2014 and January 2015). Both the activities viz., knowing the status of land required for the project and constitution of committees after inviting tenders should have been done before the awarding of contract. Further, though the work was awarded with approval of competent authority, the provisions of Tender Act have been violated.

6.2 Solar Energy

GOI has set (January 2010) the target of 1,00,000 MW of solar power to be installed in the country by 2022 under National Solar Mission (NSM). Based on the availability of land and solar radiation, the potential solar power was assessed around 7,48,000 MW, of which estimated solar potential in Tamil Nadu was 17,670 MW.

Vision Tamil Nadu 2023 included a solar energy target of 5,000 MW. The Ministry of New and Renewable Energy (MNRE) proposed (2019) a solar energy target of 9,000 MW till the year 2022 for Tamil Nadu and in line with this, Tamil Nadu Solar Energy policy, 2019, also set the same. The Solar installed capacity of Tamil Nadu at the end of March 2023 stood at 6,869.23 MW.

Though the Vision Tamil Nadu 2023 included a solar energy target of 5,000 MW and 10,000 MW for wind, TANGEDCO failed to establish any solar or wind projects on its own till date (March 2024). TANGEDCO's lapses in this connection are explained below:

6.2.1 Failure to establish Ultra Mega Solar Power Project

TANGEDCO approved (May 2017) establishment of 500 MW Kadaladi Ultra Mega solar PV power project under EPC contract. GOI also accorded (December 2017) in-principle approval for setting up of solar park at Kadaladi in Ramanathapuram District and released ₹25 lakh towards Central Financial Assistance (CFA). GoTN sanctioned (November 2018) acquisition of required patta lands and alienation of Government lands for establishment of solar power park. TANGEDCO also remitted (February 2019) ₹1.84 crore with District Collector, Ramanathapuram for alienation of land.

Meanwhile, writ petitions were filed (November 2018) by public restraining TANGEDCO from installation of solar power project at Kadaladi stating that their livelihood would be affected¹⁹. Hence, the District Collector, Ramanathapuram had suggested to find suitable alternative location. In order to complete the project early and to reduce transmission line cost and Right of Way (ROW) issues, three alternative lands, two at Kamudhi and one at Kadaladi were identified (August 2019). Subsequently, in the meeting conducted (February 2020) by MNRE, TANGEDCO did not participate even

¹⁸ Technical Bid opened in March 2014 and Price Bid in October 2014

¹⁹ Cultivation depends on rainfall and removal of palmyrah trees for the project would cause failure of rainfall.

though representatives of other States participated and discussed the issues. Hence, as no progress had been made for establishment of solar park either at Kadaladi or Kamudhi, MNRE cancelled (February 2020) the Kadaladi Solar Project citing non-representation of TANGEDCO personnel for the review meeting and tardy progress in implementation.

Though TANGEDCO identified the required lands, it did not initiate any action for acquisition of the same for implementation of solar power park resulting in cancellation of the project.

In this connection, it is pertinent to mention that a private solar power producer (Kamuthi Solar Power Project) had commissioned 648 MW solar power plant at Kamudhi for which TANGEDCO had created infrastructure (400 KV sub-station), adjacent to the solar power plant for evacuation of power. TANGEDCO also entered into power purchase agreement (September 2014) with the producer for purchase of power at the rate of ₹7.01 per unit.

Thus, failure to implement the solar park by utilising the financial assistance extended by MNRE had resulted in additional expenditure of ₹93.21 crore per annum on purchase of power from private power producers.

6.2.2 Improper maintenance of the erected Roof Top Solar Panels

Under Integrated Power Development Scheme (IPDS), TANGEDCO installed Roof top solar (RTS) panels with capacity of 2,082 kw in 177 locations (owned by TANGEDCO covering 36 Electricity Distribution Circles) at a total cost of ₹9.23 crore during 2018-20.

Audit observed that out of the 177 locations, the panels were not metered in 11 locations (100 KW) since installation (between February 2018 and October 2019). The generation from the remaining 166 locations (1,982 KW) was only 5.76 MUs during the period from 2019-20 to 2022-23 which accounted for 11.37 *per cent* of the installed capacity. The Capacity Utilisation Factor (CUF) ²⁰ of these plants also reduced from 8.95 to 7.09 *per cent* during this period which was far less than the norm of 19 *per cent* fixed by TNERC. Further, the solar panels installed at 31 locations (335 KW) were not working from various dates commencing from October 2018 and TANGEDCO did not take efforts to rectify the same.

6.3 Wind Energy

TANGEDCO has a total installed generation capacity of 7,175 MW (March 2023), out of which wind power generation capacity accounted for 17.47 MW (0.24 *per cent*). TANGEDCO erected 110 Wind Electric Generators (WEGs) of various capacities (55/90/200/225/250 KW) in Tirunelveli district during the period from 1987 to 1994 and near Udumalpet in Tiruppur District during 1993. The status of erected WEGs (farm wise) is given in **Table 40** below:

²⁰ CUF is the ratio of the average power it produces to its maximum output.

Table 40: Details of WEGs erected by TANGEDCO

Sl. No.	Name of wind farm	Period of Commissioning	Number of WEGs x Capacity (KW)	Total Capacity (MW)	Presently running
1	Kayathar – I	1988 to 1992	15x90, 7x200 & 4 x 55	2.97	-
2	Kayathar – II	1990 & 1992	22 x 200 & 6 x 225	5.75	11 x 200 KW
3	Mullakkadu	1986, 1987 & 1994	21 x 55	1.155	-
4	Muppandal	1990	20 x 200	4.00	6 x 200 KW
5	Puliyankulam	1987 & 1992	6 x 250 & 1 x 90	1.59	4 x 250 KW
6	Kethanur	1993	8 x 250	2.00	-
	Total		110	17.465	21 Nos – 4.40 MW

Source: Details provided by TANGEDCO

Thus, out of 110 WEGs (17.47 MW), only 21 WEGs (4.40 MW) are in working condition and generating power.

6.3.1 Non-repowering of old wind turbines

TANGEDCO generated 16.60 MU through the 21 WEGs that were in running condition during the period from April 2018 to November 2023, which was very low when compared to their generating capacity (52.32 MUs with 4.40 MW). The Capacity Utilisation Factor (CUF) of the individual running WEGs stood between 5.38 *per cent* and 11.00 *per cent* as against 27.15 *per cent* adopted by the TNERC for the wind turbines. This has resulted in loss of generation of 35.72 MUs for the five-year period (worked out by comparing the actual CUF with the norm fixed by TNERC). Replacement of lower capacity WEGs with improved technology and higher capacity WEGs would result in higher CUF with a consequent increased net power generation and energy yield.

Even though the life of the wind turbines erected served more than the normal useful life of 20 years, TANGEDCO considered to repower them after 30 years of commissioning, and a draft DPR was proposed (November 2023) for repowering TANGEDCO's WEGs to 41.57 MW capacity along with installation of Solar Panels of 40.5 MW capacity at a cost of ₹463.88 crore with a capital repayment period of 10 years. Final DPR of the project under BOOT²¹ mode and financial model are yet to be submitted (March 2024).

Audit noticed that the private Wind Power Generators in Tamil Nadu had repowered (March 2022) their 47 old, outdated technology WEGs with 36 new updated technology WEGs to a total capacity of 13.27 MW. It is pertinent to note that TANGEDCO had purchased 19,401 MU of wind power during the year 2018-19 to 2022-23 from private wind developers.

Despite failure of majority of WEGs, TANGEDCO had neither considered for establishment of new projects nor repowered the existing WEGs. Had the Board carried out the repowering immediately after the lifetime/failure/condemnation of the WEGs, it would have received back the capital expenditure incurred as per the DPR.

²¹ BOOT – A public private partnership under Build Own Operate and Transfer mode

Recommendations

TANGEDCO should:

- 1. Speed up the RMU activities and desilting work so as to achieve desirable capacity utilization in Kodayar and Moyar power stations;**
- 2. Implement the two hydro projects (Kundah and Kollimalai) under construction without further slippages in time schedule to add to the capacity of TANGEDCO; and**
- 3. Take early steps for repowering the old wind turbines to increase the power potential.**

Chapter – 7

CHAPTER 7

Monitoring and Internal Control

The progress/status of the projects are not reported to the Board by TANGEDCO.

Even though the independent auditors give adverse opinion every year, TANGEDCO failed to address the issues for improvement.

Due to ineffective internal control system, the shortage of coal was not addressed on time.

Monitoring is a continuous process of assessing the progress of a work/project to ensure correct, effective and smooth functioning to achieve the identified objectives and goals. Internal control is a process, effected by an entity's board of directors, management, and other personnel, designed to provide reasonable assurance that information is reliable, accurate and timely and in compliance with applicable laws, regulations, contracts, policies, and procedures.

7.1 Project Management

TANGEDCO took up execution of seven (five thermal and two hydro) projects with capacity of 6,220 MW (representing around 87 *per cent* when compared to the existing capacity) which were abnormally delayed and are still under progress (as commented in Chapter 4 and 6). In this regard, the following observations made:

i) Lack of periodical monitoring resulted in poor progress of project works

Audit observed the following lapses in execution of the projects:

- Even though periodical review meetings are being conducted at various levels on the status of the projects, the same was not reported/discussed at Board level. The Board was approached only for approvals and not apprised of the status of the Projects on a regular basis, thereby restricting the monitoring process only at the lower levels.
- The contractor could not submit the bank guarantee and consequently, the agreement was cancelled (ETPS Expansion). However, while reinstating the contract, the financials of the contractor were not analysed/ monitored properly which resulted in stalling of the project.
- Technoeconomic clearance has not been obtained for Kundah Project so far and expenditure incurred had exceeded the financial limit of GoTN for which no approval/ratification has been obtained.
- TANGEDCO deviated the Environmental Clearance issued by MoEF in respect of NCTPS-III (laying ash slurry pipelines) and Ennore SEZ (coal conveyor transportation system).

ii) Lack of effective project monitoring at TANGEDCO's level

Even though there are three levels of monitoring at TANGEDCO (Chief Engineer/Director/ CMD), all the power projects are still way behind the scheduled date of completion on account of:

- lack of real-time progress tracking which requires continuous monitoring of both physical and financial progress to ensure adherence to schedules and budgets;
- lack of risk identification and mitigation, such as delays in equipment delivery, under-performance of contractors, etc., and
- lack of focus on timely completion of projects, which led to significant cost escalations with consequent loss of potential revenue from power generation.

iii) Failure to appoint dedicated Project Monitoring Team to monitor the projects

While taking up the seven projects (five thermal and two hydro Projects) for execution, TANGEDCO has not formed a dedicated project monitoring team for each project which would have enabled as a backbone and ensured that the project is completed on time and within budget. This would also have avoided project delays consequent to approval of drawings, obtaining various clearances from competent authorities obtaining coal linkages for the thermal power projects and financing of the projects.

7.2 Internal Control

Audit noticed that internal control system of TANGEDCO was deficient particularly in the following areas:

- The Independent Auditor of TANGEDCO has reported repeatedly in its report that TANGEDCO does not have adequate internal financial control and hence material misstatements due to error or fraud may occur and may not be detected. The Independent Auditor has opined (adverse opinion) that the Financial Statements do not give a true and fair view in conformity with accounting principles and Accounting Standards (Ind AS). Despite this, TANGEDCO did not address the issues for improvement (Para 3.1 in Financial Management).
- The shortage of coal was not addressed then and there to take corrective action/avoid losses.

Recommendations

TANGEDCO should:

1. Bring to the notice of the Board about the status and progress of projects for discussion periodically;
2. A dedicated project monitoring team for each project may be engaged in order to avoid future project delays;
3. Take effective steps to improve the accounting procedures to overcome the deficiencies pointed out by Auditors and to avoid adverse opinion in future; and
4. Develop a robust internal control mechanism to report the shortages of coal periodically.

Chennai
The 19 August 2025



(R. THIRUPATHI VENKATASAMY)
Principal Accountant General (Audit-II)
Tamil Nadu and Puducherry

Countersigned



New Delhi
The 26 August 2025

(K. SANJAY MURTHY)
Comptroller and Auditor General of India

ANNEXURES

Annexure -1
(Referred to in paragraph 1.5)

Statement showing the Status of previous Audit Reports and its latest position in COPU

Sl. No.	Name of the PSU	Year of Report	Date of discussion in COPU	Status of ATN
1.	Performance Audit on Power Generation Activities of Tamil Nadu Electricity Board	2010	February 2019	Verbatim is awaited from Tamil Nadu Legislative Assembly Secretariat.
2	Performance Audit on Augmentation of Thermal Generation Capacity of TANGEDCO	2013	Yet to be discussed by COPU	Based on the receipt of Explanatory Notes (EN) from the department, brief sent to Tamil Nadu Legislative Assembly Secretariat (TNLAS) on 02/02/2022. Further action awaited from TNLAS.
3	Performance Audit on Operational Performance of Gas Turbine Power Stations of TANGEDCO.	2017	Yet to be discussed by COPU	Based on the receipt of EN from the department, brief sent to TNLAS on 25/3/2024. Further action awaited from TNLAS.
4	Performance Audit on Coal Management in Thermal Power Stations of TANGEDCO	2019	Yet to be discussed by COPU	EN received from the department. Brief is yet to be sent.

Source: Details extracted from COPU Reports

Annexure – 2
(Referred to in Paragraph 3.2.1)

i) Statement showing interest for outstanding debt paid by TANGEDCO during the review period 2018-19 to 2022-23

Loans/ Debts on Generation activities of TANGEDCO (₹ in crore)						
Sl. No.	Particulars	2018-19	2019-20	2020-21	2021-22	2022-23
1	Outstanding Debt at the beginning of the year	14,269.75	23,838.29	28,417.64	31,328.47	32,126.40
2	Debt-Additions during the year	10,725.60	5,871.93	4,124.12	2,483.94	4,620.61
3	Repayments made during the year	1,157.05	1,292.59	1,213.29	1,686.01	1,802.85
4	Outstanding Debt at the end of the year	23,838.29	28,417.64	31,328.47	32,126.40	34,944.16
Interest on Generation Activities of TANGEDCO (₹ in crore)						
1	Interest payable during the year	2079.38	2814.09	3318.16	3582.80	3779.67
2	Interest paid during the years	2079.38	2814.09	3318.16	3582.80	3779.67

Source: Annual Accounts/Details received from TANGEDCO

Total interest paid (2018-19 to 2022-23): ₹ 15,574.10 crore

ii) Statement showing details of project cost, loan availed, outstanding loan amount and interest paid in respect of ongoing projects

Sl. No	Project	Project cost	Loan availed	Outstanding loan	Interest paid
1	NCTPS Stage-III	8,723.00	4,832.68	4,832.68	1,971.66
2	Udangudi TPP	13,076.71	5,774.01	5,774.01	1,306.67
3	Ennore SEZ	10,035.13	7,668.85	7,668.85	2,892.78
4	ETPS Expansion	6,380.81	2,543.60	2,543.60	1,642.71
5	Uppur	12778	4,708.62	4,708.62	2,102.08
6	Kundah HEP	1,831.29	923.63	909.31	158.56
7	Kollimalai SHP	338.79	195.13	193.20	32.94
	Total	53,163.73	26,646.52	26,630.27	10,107.40

iii) Excess IDC incurred in respect of projects under construction

Sl. No	Project	IDC amount (₹ in crore)		
		As per Original DPR	As of March 2023	Increase
1	NCTPS-III	1,335.88	1,971.66	635.78
2	Udangudi	9,083.00	1,306.67	-
3	Ennore SEZ	987.23	2,892.78	1,905.55
4	ETPS Expansion	572.07	1,642.71	1,070.64
5	Uppur	2,243.28	2,102.08	-
Total				3,611.97

Source: Details furnished by TANGEDCO

Annexure 3
(Referred to in Paragraph 3.4)

**Statement showing payment of higher interest due to non-compliance to pre
disbursement conditions (MTPS-II)**

Year	Outstanding Balance as on 31st March (₹ in crore)	Rate of interest (%)	Interest paid (₹ in crore)	Excess interest Paid (₹ in crore)
2018-19	2,139.04	12.15	259.89	5.348
2019-20	1,887.39	12.15	229.32	4.718
2020-21	1,875.43	12.65	237.24	4.689
2021-22	1,620.48	12.65	204.99	4.051
2022-23	1,368.83	12.65	173.15	3.422
			Total	22.23

Source: Details received from TANGEDCO

Annexure - 4
(Referred to in Paragraph 4.1.2 (a))

Statement showing avoidable forced outages and purchase of power from private generators at a higher cost

1. MTPS - II

Year	Boiler, Turbine & Generator	Ash Evacuation	Total	Cost of own Generation (Variable Cost) ₹ per unit	Purchase of power from private sources (₹ per unit)	Difference (₹ per unit)	Loss of Generation		
							BTG	Ash Excavation	Total
	(MU)	(MU)	(MU)	₹ per unit	(₹ per unit)	(₹ per unit)	(₹ in crore)	(₹ in crore)	(₹ in crore)
	(1)	(2)	(3) = (1)+(2)	(4)	(5)	(6) = (5)-(4)	(7) = (1x6/10)	(8) = (2x6/10)	(9) = (7)+(8)
2018-19	274.54	0	274.54	2.93	5.05	2.12	58.20	0.00	58.20
2019-20	129.77	0	129.77	3.06	5.11	2.05	26.60	0.00	26.60
2020-21	8.98	0	8.98	2.60	5.7	3.10	2.78	0.00	2.78
2021-22	55.38	329.28	384.66	2.81	5.92	3.11	17.22	102.41	119.63
2022-23	203.63	181.04	384.67	3.66	6.96	3.30	67.20	59.74	129.64
Total	672.30	510.32	1182.62				172.01	162.15	334.16

Source: Performance reports of TANGEDCO for five years ended 2022-23 and Power purchase return submitted by TANGEDCO to TNERC

2. NCTPS-II

Year	Boiler, Turbine & Generator	Ash Evacuation	Total	Cost of own Generation (Variable Cost)	Purchase of Power from private sources	Difference	Loss of Generation		
							BTG	Ash Excavation	Total
	(MU)	(MU)	(MU)	₹ per unit	(₹ per unit)	(₹ per unit)	(₹ in crore)	(₹ in crore)	(₹ in crore)
	(1)	(2)	(3) =(1)+(2)	(4)	(5)	(6) = (5)-(4)	(7)=(1x6/10)	(8)=(2x6/10)	(9)=(7)+(8)
2018-19	813.64	0	813.64	2.93	5.05	2.12	172.49	0.00	172.49
2019-20	791.41	0	791.41	3.06	5.11	2.05	162.24	0.00	162.24
2020-21	1651.71	0	1651.71	2.60	5.7	3.10	512.03	0.00	512.03
2021-22	502.13	2727.62	3229.75	2.81	5.92	3.11	156.16	848.29	1004.45
2022-23	1651.33	0	1651.33	3.66	6.96	3.30	544.94	0.00	544.94
Total	5410.22	2727.62	8137.84				1547.86	848.29	2,396.15

Source: Performance reports of TANGEDCO for five years ended 2022-23 and Power purchase return submitted by TANGEDCO to TNERC

Total (MTPS-II and NCTPS-II): ₹334.16 crore + ₹2,396.15 crore = ₹2,730.31 crore

Annexure - 5
(Referred to in Paragraph 4.1.2 (b))

Statement showing additional expenditure incurred on account of non- availability of power due to reserved shut downs

1. MTPS -II

Year	Loss of generation due to reserved outages	Cost of own Generation (Variable Cost)	Purchase of power from private sources	Difference	Total
	(MU)	₹ per unit	(₹ per unit)	(₹ per unit)	(₹ in crore)
	(1)	(2)	(3)	(4) = (3)-(2)	(5) = (1) x (4)/10
2018-19	583.86	2.93	5.05	2.12	123.78
2019-20	1354.03	3.06	5.11	2.05	277.58
2020-21	3102.89	2.60	5.7	3.10	961.90
2021-22	338.03	2.81	5.92	3.11	105.13
2022-23	150.72	3.66	6.96	3.30	49.74
Total	5529.53				1,518.12

Source: Performance reports of TANGEDCO and Power purchase return submitted by TANGEDCO

2. NCTPS -II

Year	Loss of generation due to reserved outages	Cost of own Generation (VC)	Purchase of Power from private sources	Difference	Total
	(MU)	₹ per Unit	(₹ per unit)	(₹ per unit)	(₹ in crore)
	(1)	(2)	(3)	(4) = (3)-(2)	(5) = (1) x (4)/10
2018-19	838.63	2.93	5.05	2.12	177.19
2019-20	1906.12	3.06	5.11	2.05	390.75
2020-21	3108.64	2.60	5.7	3.10	963.68
2021-22	33.69	2.81	5.92	3.11	10.48
2022-23	535.94	3.66	6.96	3.30	176.86
Total	6423.02				1,719.56

Source: Performance reports of TANGEDCO and Power purchase return submitted by TANGEDCO

Total expenditure: ₹1,518.12 crore + ₹1,719.56 crore = ₹3,237.68 crore

Annexure - 6
(Referred to in Paragraph 4.1.2 (c))

Statement showing generation loss due to running the units at partial load

1. MTPS -II

Year	Shortfall in Generation due to operation at partial load	Cost of own Generation	Purchase of Power from private sources	Difference	Additional Expenditure
	(MU)	₹ per Unit	(₹ per unit)	(₹ per unit)	(₹ in crore)
(1)	(2)	(4)	(3)	(5) = (4) - (3)	(6) = (2)*(5)/10
2018-19	801.10	2.93	5.05	2.12	169.83
2019-20	728.89	3.06	5.11	2.05	149.42
2020-21	399.99	2.60	5.7	3.10	124.00
2021-22	1336.60	2.81	5.92	3.11	415.68
2022-23	1281.70	3.66	6.96	3.30	422.96
Total	4548.28				1,281.90

Source: Performance reports of TANGEDCO and Power purchase return submitted by TANGEDCO

2. NCTPS -II

Year	Shortfall in Generation due to operation at partial load	Cost of own Generation	Purchase of Power from private sources	Difference	Additional Expenditure
	(MU)	₹ per Unit	(₹ per unit)	(₹ per unit)	(₹ in crore)
(1)	(2)	(4)	(3)	(5) = (4) - (3)	(6) = (2)*(5)/10
2018-19	1274.09	2.93	5.05	2.12	270.11
2019-20	1261.37	3.06	5.11	2.05	258.58
2020-21	1064.13	2.60	5.7	3.10	329.88
2021-22	2736.23	2.81	5.92	3.11	850.97
2022-23	1868.60	3.66	6.96	3.30	616.64
Total	8204.42				2,326.17

Source: Performance reports of TANGEDCO and Power purchase return submitted by TANGEDCO

Total Expenditure: ₹1,281.90 crore + ₹2,326.17 crore = ₹3,608.07 crore

Annexure - 7
(Referred to in Paragraph 4.1.3)

Statement showing extra expenditure incurred due to frequent startups

1. MTPS -II

Sl. No	Particulars	2018-19	2019-20	2020-21	2021-22	2022-23	Total
1	Total No. of Trippings	10	7	8	11	15	51
2	CERC Norms (Nos.)	2	2	2	2	2	10
3	Excess Trippings (Nos.) [(1) - (2)]	8	5	6	9	13	41
4	Average Startup Cost (₹ crore)	0.88	0.93	0.67	0.68	0.67	---
5	Excess Expenditure (₹ crore) [(3) x (4)]	7.04	4.65	4.04	6.12	8.75	30.60

Source: Details received from TANGEDCO

2. NCTPS -II

Sl. No	Particulars	2018-19	2019-20	2020-21	2021-22	2022-23	Total
1	Total No. of Trippings	44	34	32	25	72	207
2	CERC Norms (Nos.)	2	2	2	2	2	10
3	Excess Trippings (Nos.) [(1) - (2)]	42	32	30	23	70	197
4	Average Startup Cost (₹ crore)	0.37	0.37	0.37	0.37	0.37	
5	Excess Expenditure (₹ crore) [(3) x (4)]	15.68	11.95	11.20	8.59	26.13	73.55

Source: Details received from TANGEDCO

Total excess expenditure: ₹104.15 crore

Annexure - 8 (a)
(Referred to in Paragraph 4.1.4)

Statement showing Excess Manpower at power stations (MTPS-II)

No	Manpower for 600 MW as per CEA norms	Norms	2018-19			2019-20			2020-21			2021-22		2022-23		Actual strength (%)
			Sancti- oned strength	Actual strength (%)	Sancti- oned strength	Actual strength (%)	Sancti- oned strength	Actual strength (%)	Sancti- oned strength	Actual strength (%)	Sancti- oned strength	Actual strength (%)	Sancti- oned strength	Actual strength (%)	Sancti- oned strength	Actual strength (%)
1	Executives	20% of Manpower	277	223	274	215	364	273	217	368	273	219	271	224	380	
2=	Non-Executives	80% of Manpower	535	155	548	160	68	557	138	58	557	153	557	147	62	
a.	Supervisors	59	111	65	120	69	117	126	69	117	126	69	126	71	120	
b.	Workmen	177	424	90	428	91	51	431	69	39	431	84	431	76	43	
	Total (1+2)	295	812	378	822	375	127	830	355	120	830	372	828	371	126	

Source: Details received from TANGEDCO

Statement showing payment of excess salary (MTPS-II)

Sl. No	Year	Excess Salary incurred (₹ in crore)
1	2018-19	18.67
2	2019-20	19.18
3	2020-21	20.54
4	2021-22	21.27
5	2022-23	24.12
	Total	103.78

Annexure - 8 (b)
(Referred to in Paragraph 4.1.4)

Statement showing Excess Manpower at power stations (NCTPS-II)

No	Manpower for 600 MW as per CEA norms	Norm	2018-19			2019-20			2020-21			2021-22			2022-23		
			Sanctioned strength	Actual strength (%)	Actual strength (%)	Sanctioned strength	Actual strength	Actual strength (%)	Sanctioned strength	Actual strength	Actual strength (%)	Sanctioned strength	Actual strength	Actual strength (%)	Sanctioned strength	Actual strength	Actual strength (%)
1	Executives	20% of Manpower	371	263	277	370	201	212	370	216	227	369	218	229	368	206	
2=(a+b)	Non-Executives	80% of Manpower	473	180	47	469	280	74	496	210	55	497	242	64	492	226	
a.	Supervisors		59	39	41	55	43	45	57	46	48	53	40	42	59	32	
b.	Workmen		414	141	50	414	237	83	439	164	58	444	202	71	433	194	
		Total (1+2)	844	443	93	839	481	101	866	426	90	866	460	97	860	432	

Source: Details received from TANGEDCO

Statement showing payment of excess salary (NCTPS-II)

Sl.No	Year	Excess Salary incurred (₹ in crore)
1	2018-19	17.35
2	2019-20	15.45
3	2020-21	14.69
4	2021-22	15.93
5	2022-23	20.54
	Total	83.96

Annexure -9
(Referred to in paragraph 4.2)

Details of Coal Supply Agreements executed by TANGEDCO

Coal Supplying Company	Year of FSA	Power Plant and Quantity Allotted (in LTs)						ACQ (in LTs)	Agreed Grade of Coal
		ETPS	TTPS	MTPS-I	NCTPS-I	MTPS-II	NCTPS-II		
ECL	2009	3.20	4.30	2.50	4.25	-	-	14.25	A to F
MCL	2009	13.12	44.27	36.36	25.00	-	-	118.75	E/F
MCL #	2012	-	-	-	-	23.15	-	23.15	G8 to G13
MCL \$	2013	-	-	-	-	-	46.30	46.30	G8 to G13
CCL	2016	-	10.00	-	-	-	-	10.00	G4 to G9
		16.32	58.57	38.86	29.25	23.15	46.30	212.45	
ECL (Siding)	2016	-	-	-	-	-	-	25.00	G3 to G5

Source: Details extracted from Fuel Supply Agreements

FSA represents Fuel Supply Agreements
ACQ represents Annual Contracted Quantity
LTs represents Lakh Tonnes

increased to 25.72 LT from January 2023

\$ increased to 51.44 LT from January 2023

Details of MOU entered with SCCL

Details of MOU	Coal Company	Validity of MOU	Quantity (per annum in LT)	Grade
MOU-I	SCCL	21.03.2020 to 31.03.2021	10	G8 to G15
MOU-I (Supplement I)	SCCL	01.04.2021 to 31.03.2022	30	
MOU-I (Supplement II)	SCCL	01.04.2022 to 31.03.2023	40 (including balance quantity allocated for previous years)	
MOU –II	SCCL	2023-2024	25	

Source: MOUs executed between TANGEDCO and SCCL

Annexure -10
(Referred to in paragraph 4.2.6 (ii))

Port-wise details of reimbursement of terminal charges

Contractor	Period of contract	Weight as per Bill of Supply	Actual Weight	Difference	Excess Reimbursement
		Quantity in Lakh Tonnes			(₹ in crore)
Paradip	April 2018 to July 2022 ¹	254.87	237.49	17.38	5.16
VPT	August 2019 to July 2022 ²	55.13	52.39	2.73	0.81
Total		310.00	289.88	20.11	5.97

Source: Details received from TANGEDCO

¹ Subsequent bills not raised by the contractor.

² Contract terminated thereafter.

Annexure - 11
(Referred to in paragraph 4.2.6 (iii))

Details showing the payment of wagon haulage charges

Port	Period	Quantity handled (Lakh MT)	Rate per MT (₹)			Excess Expenditure (₹ in crore)
			TANGEDCO	68/MT CC	Difference	
Vizag	4/2018 to 3/2019	17.71	25.94	23.99	1.95	0.34
Haldia	4/2018 to 3/2019	23.34	43.58	40.25	3.33	0.77
Paradip	4/2018 to 9/2019	39.45	35.69	34.12	1.57	0.62
	10/2019 to 3/2023	36.33	35.85	34.26	1.59	0.57
Total						2.30

Source: Details received from TANGEDCO

CC represents Carrying capacity

Annexure-12
(Referred to in Paragraph 4.2.7(ii))

Statement showing drop in GCV between receipt point at power stations and at bunkers

Year	GCV of coal 'as received' at the unloading point		GCV of coal 'as fired' at the boilers		Drop in GCV	
	Indian Coal GCV(Kcal/Kg)	Imported Coal GCV (Kcal/Kg)	Indian Coal GCV(Kcal/Kg)	Imported Coal GCV (Kcal/Kg)	Indian Coal GCV(Kcal/Kg)	Imported Coal GCV (Kcal/Kg)
Apr-2018	3255	4916	3079	4415	176	501
May-2018	3360	4560	2937	4220	423	340
Jun-2018	3256	4749	2909	4255	347	494
Jul-2018	3401	---	3155	4525	246	---
Aug-2018	3399	---	3260	4345	139	---
Sep-2018	3420	4837	3226	4416	194	421
Oct-2018	3182	4297	2968	4337	214	-40
Nov-2018	3209	4855	3127	4575	82	280
Dec-2018	3256	4812	3235	4805	21	7
Jan-2019	3221	4592	3279	4370	-58	222
Feb-2019	3225	4629	3234	4455	-9	174
Mar-2019	3213	4799	3200	4655	13	144
Apr-2019	3203	4603	2978	4260	225	343
May-2019	3267	4654	2958	4185	309	469
Jun-2019	3228	4739	3004	4325	224	414
Jul-2019	3215	4794	3055	4565	160	229
Aug-2019	3158	4612	2980	4365	178	247
Sep-2019	3163	4572	2819	4440	344	132
Oct-2019	3117	4509	2734	4209	383	300
Nov-2019	3176	4173	2902	4028	274	145
Dec-2019	3093	3838	2887	3940	206	-102
Jan-2020	3218	4172	2977	3866	241	306
Feb-2020	3199	3890	3035	3871	164	19
Mar-2020	3278	4186	3051	3706	227	480
Apr-2020	3240	3971	---	---	---	---
May-2020	3258	3617	3039	3866	219	-249
Jun-2020	3216	3836	3070	3776	146	60
Jul-2020	3218	4117	3091	3737	127	380
Aug-2020	3173	---	3150	3515	23	---
Sep-2020	---	---	3040	3755	---	---
Oct-2020	---	---	---	---	---	---
Nov-2020	---	---	---	---	---	---
Dec-2020	---	---	2765	3442	---	---
Jan-2021	---	---	---	---	---	---

Year	GCV of coal 'as received' at the unloading point		GCV of coal 'as fired' at the boilers		Drop in GCV	
	Indian Coal GCV(Kcal/Kg)	Imported Coal GCV (Kcal/Kg)	Indian Coal GCV(Kcal/Kg)	Imported Coal GCV (Kcal/Kg)	Indian Coal GCV(Kcal/Kg)	Imported Coal GCV (Kcal/Kg)
Feb-2021	3210	---	3303	3396	-93	---
Mar-2021	3302	3934	3115	3870	187	64
Apr-2021	3236	3973	2950	3756	286	217
May-2021	3342	3918	2994	3761	348	157
Jun-2021	3389	---	2976	---	413	---
Jul-2021	3417	---	3105	---	312	---
Aug-2021	3319	---	3107	---	212	---
Sep-2021	2963	---	2970	---	-7	---
Oct-2021	3004	---	3058	---	-54	---
Nov-2021	3107	---	3097	---	10	---
Dec-2021	3073	---	3024	---	49	---
Jan-2022	3067	---	3048	---	19	---
Feb-2022	2988	---	3076	---	-88	---
Mar-2022	3002	---	3107	---	-105	---
Apr-2022	3228	---	3122	---	106	---
May-2022	3173	---	3188	---	-15	---
Jun-2022	3266	4403	3161	4460	105	-57
Jul-2022	3107	4007	2966	4012	141	-5
Aug-2022	3004	4055	2876	3882	128	173
Sep-2022	3063	3994	2920	3850	143	144
Oct-2022	2912	3894	2909	3630	3	264
Nov-2022	2998	3585	2839	3565	159	20
Dec-2022	2941	3808	2810	3770	131	38
Jan-2023	2974	3873	2784	3710	190	163
Feb-2023	3019	3924	2944	3765	75	159
Mar-2023	3072	3891	3006	3695	66	196

Source: Detail furnished by TANGEDCO

“---” represents Not Available

Annexure-13 (a)
(Referred to in Paragraph 4.2.7 (iii))

Statement showing variation in GCV during direct feeding on the same day (MTPS II)

Day	Total Quantity of coal received and its GCV at Power Station		Total Quantity of direct feeding on the same day	
	Total Quantity (MT)	GCV (Kcal/Kg)	Total Quantity (MT)	GCV (Kcal/Kg)
Apr-20	89796.80	3661	---	---
May-20	98021.13	3395	64049.71	3302
Jun-20	193377.34	3241	68763.63	3238
Jul-20	200900.33	3586	107547.20	3425
Aug-20	81041.49	3173	2765.58	3173
Sep-20	---	---	---	---
Oct-20	---	---	---	---
Nov-20	---	---	---	---
Dec-20	---	---	---	---
Jan-21	---	---	---	---
Feb-21	77537.25	3210	24259.40	3210
Mar-21	226888.35	3358	142529.86	3337
Apr-21	190412.22	3347	93889.72	3319
May-21	287948.50	3399	134799.50	3398
Jun-21	117770.61	3389	176817.42	3389
Jul-21	180948.28	3417	67289.13	3417
Aug-21	101643.25	3319	22764.45	3319
Sep-21	35134.00	2963	5227.40	2963
Oct-21	170099.99	3004	89232.79	3004
Nov-21	94297.95	3107	25571.41	3107
Dec-21	216826.55	3073	125735.08	3073
Jan-22	210154.04	3067	100312.20	3067
Feb-22	133120.75	2988	53604.14	2988
Mar-22	201784.20	3002	92729.91	3002
Apr-22	199832.21	3228	120345.31	3228
May-22	243270.35	3173	137022.48	3173
Jun-22	202307.14	3508	122626.69	3304
Jul-22	171093.12	3364	83915.23	3237
Aug-22	157765.25	3107	73913.81	3004
Sep-22	143732.14	3253	32874.08	3306
Oct-22	135789.64	3274	56548.26	3292
Nov-22	198330.45	3047	141523.20	3016
Dec-22	237499.62	3115	139048.40	3020
Jan-23	232843.35	3108	114835.01	3152
Feb-23	208539.90	3049	107940.07	3019
Mar-23	218961.38	3202	154558.10	3125

Source: Details received from TANGEDCO

“---” represents Not Available

Annexure-13 (b)
(Referred to in Paragraph 4.2.7 (iii))

Statement showing variation in GCV during direct feeding on the same day (NCTPS II)

Month	GCV of Coal "as received" at the Unloading Point (Air Dried Basis)		GCV of Coal of "as fired" at the boilers		Drop in GCV	
	Indian (Kcal/Kg)	Imported (Kcal/Kg)	Indian (Kcal/Kg)	Imported (Kcal/Kg)	Indian (Kcal/Kg)	Imported (Kcal/Kg)
Apr-18	3579	5570	3242	4730	337	840
May-18	3588	5532	3155	4706	433	826
Jun-18	3592	5563	3122	4613	470	950
Jul-18	3565	No receipt	3096	NCC	469	NCC
Aug-18	3558		3002		556	
Sep-18	3525		2994		531	
Oct-18	3554	5606	3032	4781	522	825
Nov-18	3622	5646	3140	4638	482	1008
Dec-18	3643	5586	3215	4600	428	986
Jan-19	3656	5635	3259	4588	397	1047
Feb-19	3622	5598	3323	4625	299	973
Mar-19	3628	5616	3428	4609	200	1007
Apr-19	3585	5637	3490	4724	95	913
May-19	3599	5628	3504	4738	95	890
Jun-19	3600	5643	3460	4742	140	901
Jul-19	3614	5455	3206	4746	408	709
Aug-19	3604	5409	3161	4732	443	677
Sep-19	3537	5486	3131	4716	406	770

Month	GCV of Coal "as received" at the Unloading Point (Air Dried Basis)		GCV of Coal of "as fired" at the boilers		Drop in GCV	
	Indian (Kcal/Kg)	Imported (Kcal/Kg)	Indian (Kcal/Kg)	Imported (Kcal/Kg)	Indian (Kcal/Kg)	Imported (Kcal/Kg)
Oct-19	3547	5335	3189	4505	358	830
Nov-19	3540	5630	3164	4488	376	1142
Dec-19	3506	5316	2979	4459	527	857
Jan-20	3483	5670	2981	4503	502	1167
Feb-20	3473	5312	2838	4513	635	799
Mar-20	3389	5646	2921	4578	468	1068
Apr-20	3419	5414	N C C	N C C	N C C	N C C
May-20	3444	4987	2953	4475	491	512
Jun-20	3386	5266	2956	4405	430	861
Jul-20	3327	5347	3032	4458	295	889
Aug-20	3286	4972	2984	4358	302	614
Sep-20	3380	5302	2830	4224	550	1078
Oct-20	3191	No Receipt	2951	4392	240	N C C
Nov-20	3111	---	3028	4444	83	---
Dec-20	3120	---	3049	4227	71	---
Jan-21	3079	---	3027	4163	52	---
Feb-21	3157	---	3167	N C C	-10	---
Mar-21	3303	5445	3135	4808	168	637
Apr-21	3323	5458	3070	4688	253	---
May-21	3350	No receipt	N C C	N C C	N C C	---
Jun-21	3249	---	3010	4806	239	---
Jul-21	3340	---	3023	N C C	317	---
Aug-21	3318	---	3107	---	211	---

Month	GCV of Coal "as received" at the Unloading Point (Air Dried Basis)		GCV of Coal of "as fired" at the boilers		Drop in GCV	
	Indian (Kcal/Kg)	Imported (Kcal/Kg)	Indian (Kcal/Kg)	Imported (Kcal/Kg)	Indian (Kcal/Kg)	Imported (Kcal/Kg)
Sep-21	3304	---	3198	---	106	---
Oct-21	3226	---	3173	---	53	---
Nov-21	3149	---	3023	---	126	---
Dec-21	3181	---	3081	---	100	---
Jan-22	3160	---	2936	---	224	---
Feb-22	3218	---	3070	---	148	---
Mar-22	3195	---	3001	---	194	---
Apr-22	3270	---	3190	---	80	---
May-22	3276	4956	3163	4945	113	11
Jun-22	3266	4973	2955	4832	311	141
Jul-22	3220	4980	2874	4728	346	252
Aug-22	3158	4982	2712	4676	446	306
Sep-22	3175	No receipt	2673	4507	502	N C C
Oct-22	3217	4984	2808	4387	409	597
Nov-22	3044	4978	2625	4414	419	564
Dec-22	3153	No receipt	2966	4573	187	N C C
Jan-23	3228	---	3005	4588	223	---
Feb-23	3269	---	3066	4657	203	---
Mar-23	3101	4933	2929	4726	172	207

Source: Details received from TANGEDCO

Annexure 14
(Referred to in Paragraph 5.2.2)

Statement showing loss of generation coupled with additional expenditure due to inadequate supply of gas

Particulars/ Year	KGTPS					VGTPS II				
	2018-19	2019-20	2020-21	2021-22	2022-23	2018-19	2019-20	2020-21	2021-22	2022-23
Contracted quantity of gas (SCM)	164250000	164250000	164250000	164250000	164250000	159870000	159870000	159870000	159870000	159870000
Quantity of gas supplied (SCM)	96007700	30453100	103757200	106363800	120551600	127956000	123079000	114600000	10555300	8308600
Short supply of gas (SCM)	68242399	133796900	60492800	57886200	43698400	31914000	36791000	45270000	54317000	76784000
Percentage of shortage	41.55	81.46	36.83	35.24	26.60	19.96	23.01	28.32	33.98	48.03
Specific Gas Consumption (SCM)	0.234	0.2276	0.2118	0.294	0.2196	0.2182	0.2155	0.2123	0.2344	0.2393
Loss of generation (MUs)	15.97	30.45	12.81	17.02	9.60	6.96	7.93	9.61	35.00	36.27
Variable Cost per unit (₹ per unit)	3.13	2.83	1.84	3.07	6.66	2.36	2.55	2.20	1.82	6.13
Average power purchase cost (₹ per unit)	5.05	5.11	5.70	5.92	6.96	5.05	5.11	5.70	5.92	6.96
Additional expenditure incurred (₹ crore)	3.07	6.93	4.94	4.85	0.29	1.87	2.03	3.36	14.35	3.01
						Total Additional expenditure: ₹44.70 crore				

Source: Performance reports of TANGEDCO for the respective years

Glossary of abbreviations	
Abbreviation	Full form
ACS	Average Cost of Supply
AHS	Ash Handling System
ARR	Aggregate Revenue Requirement
ARR	All Rail Route
BBU	Billing Break-up
BEE	Bureau of Energy Efficiency
BHEL	Bharat Heavy Electricals Limited
BLTC	Board Level Tender Committee
BTG	Boiler, Turbine and Generator
C&AG	Comptroller and Auditor General of India
CC	Carrying Capacity
CCL	Central Coalfields Limited
CEA	Central Electricity Authority
CERC	Central Electricity Regularity Commission
CHS	Coal Handling System
CIL	Coal India Limited
CMD	Chairman Cum Managing Director
COD	Commercial Operation Date
COPU	Committee on Public Undertakings
CP	Charter Party
CUF	Capacity Utilisation Factor
DC	Designated Consumer
DISCOM	Distribution Company
DNQ	Daily Nominated Quantity
DPR	Detailed Project Report
DRIP	Dam Rehabilitation and Improvement Projects
DT meter	Distribution Transformer meter
ECL	Eastern Coalfields Limited
EDC	Electricity Distribution Circle

Glossary of abbreviations	
Abbreviation	Full form
G-13	Grade- 13
GAIL	Gas Authority of India Limited
GCV	Gross Calorific Value
GO	Government Order
GoI	Government of India
GoTN	Government of Tamil Nadu
GST	Goods and Service Tax
GTPS	Gas Turbine Power Station
HT	High Tension
HUDCO	Housing and Urban Development Corporation Limited
ID fan	Induced Draught fan
IDC	Interest During Construction
Ind As	Indian Accounting Standards
IoWC	Interest on Working Capital
JICA	Japan International Co-operation Agency
Kcal	Kilocalories
KGTPS	Kuttalam Gas Turbine Power Station
KV	Kilo Volt
Kwh	Kilowatt hour
LD	Liquidated Damages
LE	Life Extension
LOG	Loss of Generation
LT	Low Tension
LTOA	Long Term Open Access
MCFT	Million Cubic Feet
MCL	Mahanadi Coalfields Limited
MGO	Minimum Guaranteed Off-take
MIS	Management Information System

Glossary of abbreviations	
Abbreviation	Full form
MVA	Mega Volt Amp
MW	Mega Watt
NAPCC	National Action Plan on Climate Change
NCTPS	North Chennai Thermal Power Station
NEP	National Electricity Policy
NGT	National Green Tribunal
OEM	Original Equipment Manufacturer
OLTC	On-load-tap Changer
ONGC	Oil and Natural Gas Corporation Limited
PAF	Plant Availability Factor
PAT	Perform Achieve and Trade
PDFACS	Pressurized Dense Fly Ash Conveying System
PFC	Power Finance Corporation
PG Test	Performance Guarantee Test
PLF	Plant Load Factor
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PSU	Public Sector Undertaking
PUSHEP	Pumped Storage Hydro Electric Projects
R&M	Renovation and Modernisation
RAS	Revised Administrative Sanction
RE	Reverse Engineering
REC	Rural Electrification Corporation Limited
RLA	Residual Life Assessment
RMU	Renovation, Modernisation and uprating
ROE	Return on Equity
RPO	Renewable Purchase Obligation
RSH	Reserved Shutdown Hours

Glossary of abbreviations	
Abbreviation	Full form
T(K)GTPS	Thirumakkottai Gas Turbine Power Station
T.O	Tariff Order
TANGEDCO	Tamil Nadu Generation and Distribution Corporation Limited
TANTRANSCO	Tamil Nadu Transmission Corporation Limited
TNEB	Tamil Nadu Electricity Board
TNERC	Tamil Nadu Electricity Regulatory Commission
TNIDB	Tamil Nadu Infrastructure Development Board
TNIFMC	Tamil Nadu Infrastructure Fund Management Corporation Limited
TNPFC	Tamil Nadu Infrastructure Development and Power Finance Corporation Limited
TPS	Thermal Power Station
TRT	Tail Race Tunnel
TSD	Total Shutdown
TTPS	Tuticorin Thermal Power Station
UDAY	Ujwal DISCOM Assurance Yojana
USD	United States Dollar
VAT	Value Added Tax
VGTPS	Valuthur Gas Turbine Power Station
WEGs	Wind Electric Generators

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