

MONITORING KEY PERFORMANCE INDICATORS (KPIs) of TANGEDCO



AurovilleConsulting

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ABBREVIATIONS

| | |
|----------|--|
| ABR | Average Billing Rate |
| ACoS | Average Cost of Supply |
| ARR | Aggregate Revenue Required |
| AT&C | Aggregate Technical and Commercial Losses |
| CapEx | Capital Expenditure |
| CO2e | Carbon dioxide equivalent |
| D/E | Debt to Equity Ratio |
| DISCOM | Distribution Companies |
| DREG | Distributed Renewable Energy Generation |
| ESG | Environment Social Governance |
| ESGF | Environment Social Governance Finance |
| FACR | Fixed Asset Coverage Ratio |
| FY | Financial Year |
| GoI | Government of India |
| HT | High Tension |
| INR | Indian National Rupee |
| KPIs | Key Performance Indicators |
| kW | Kilowatt |
| kWh | Kilowatt-hour |
| LT | Low Tension |
| MU | Million Units |
| MW | Megawatt |
| N/A | Not Available |
| NDSAP | National Data Sharing and Accessibility Policy |
| RE | Renewable Energy |
| RPO | Renewable Energy Purchase Obligation |
| SAIDI | System Average Interruption Duration Index |
| SAIFI | System Average Interruption Frequency Index |
| TANGEDCO | Tamil Nadu Generation and Distribution Company |
| TNERC | Tamil Nadu Electricity Regulatory Commission |

EXECUTIVE SUMMARY

KEY PERFORMANCE INDICATORS

Inspired by the method of Environmental, Social, and Governance (ESG) reporting, this report attempts to consolidate data on the performance of Tamil Nadu Generation and Distribution Company (TANGEDCO). The aim of this work is to initiate and develop holistic benchmarks. These key performance indicators would help TANGEDCO to track its own performance. A total of 34 key performance indicators¹ were introduced for this report, these KPIs were grouped under four categories: Environment, Social, Governance, and Finance. Out of the 34 KPIs, only twenty-five could be computed. For the remaining nine indicators, data was unavailable for few years or for all the years in the reporting period. These nine indicators for which data was not available fall primarily under the Social and Governance categories.

DATA AND TRANSPARENCY

The unavailability of data in the public domain indicates a need for better data governance by TANGEDCO. Being a public utility, having an open data policy and a proactive sharing of data by standardized formats are imperative. Storing government data in open formats would enhance transparency and accountability while encouraging public engagement. Understanding the importance of sharing the data with civil society, the National Data Sharing and Accessibility Policy (NDSAP) emphasises making data available for legitimate and registered use (NDSAP 2012).

KEY FINDINGS

There is a growth in both the capacity and generation of Renewable Energy and Distributed Renewable Energy during the reporting period from FY 2014-15 to FY 2018-19. However, the Renewable Energy Purchase Obligation was not met by TANGEDCO in any of these years (TNERC 2017a). The tonnes of CO₂ equivalent released increased over in this period by 10.05%. The subsidy allocation per unit from the Government of Tamil Nadu to agriculture, increased by 30% while that of domestic decreased by 1%. TANGEDCO incurred losses on certain low voltage (LT) consumer categories despite Government subsidies and tariff cross-subsidies. They are LT I-A, LT I-B, LT I-C, and LT-IV. For all HT tariff categories TANGEDCO earns a net positive revenue except the HT IV Lift Irrigation. This is one of the reasons for the poor financial performance of TANGEDCO. The overall financial KPIs of TANGEDCO are alarmingly poor given that its liabilities are higher than assets, the working capital and profit after tax are negative.

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¹ Out of the many indicators, these 34 indicators are chosen to best represent the environmental, social, governance, and financial categories of TANGEDCO.

INTRODUCTION

The state of Tamil Nadu is one of the front runners in electrification in the country with a 100% electrified network. TANGEDCO, the state-owned and only electricity utility in Tamil Nadu serves about 307 lakhs consumers (TANGEDCO 2020). In FY 2019-20 the annual electricity demand in the state was 1,14,033 Million Units (MU). The total installed generation capacity is 31.89 GW. Renewable energy sources account for an installed capacity of 15.78 GW or 49.47% of the total installed capacity (Energy Department of Tamil Nadu 2021). Being the only electric utility in Tamil Nadu, TANGEDCO's services are paramount for the overall economic development of the State, and for the social and environmental wellbeing of all its citizens. TANGEDCO has the responsibility to be transparent to the citizens of Tamil Nadu.

Sharing the trued-up values in the public domain would ensure transparency on the status of TANGEDCO. Say for example, the digitalised version of balance sheets is available for only six financial years out of the last ten years. Certain financial parameters of the utility are unavailable even in the existing balance sheets. TANGEDCO has filed a tariff petition on generation and distribution in 2017. Since then, there is no revision in tariffs and reconciliation or true ups of the approved values. This creates a data gap in understanding the actual figures on power purchase quantum, revenue from sales, etc.

The key performance indicators (KPIs) are indexes used to measure the achievement of pre-defined key objectives. The objective of this report is to introduce key performance indicators (KPIs) that allow the monitoring of TANGEDCO's performance over the years. The KPIs are grouped into four categories environmental, social, governance, and financial, and are inspired by the Environmental, Social, Governance (ESG) reporting framework, which aims at facilitating greater transparency, and better communication and engagement with the stakeholders (BSE 2021).

The KPIs introduced in this report aim to bridge the lack of publicly available and holistic reporting mechanisms by TANGEDCO², with the hope that the utility will be inspired to develop and publish similar reports in the future. Publicly available datasets were used to compute the KPI outputs presented in this report. The unavailability of public data for calculating several of the proposed KPIs is a constraint. In the case where data was not available no computation of the KPI was undertaken, however in such a case the KPI and its computational method were listed as a recommendation. These recommendations will be helpful for TANGEDCO to initiate reporting the missing data, which could help TANGEDCO measure and manage its performance.

“Good quality and timely energy data are fundamental for monitoring energy policies, reviewing their progress, and enforcing their implementation. The Government of India (GoI) has identified the critical importance of energy data and is taking action to improve energy data collection and dissemination.”

– (India 2020 – Energy Policy Review 2020)

² Hereafter TANGEDCO is referred as 'the utility' in this report

DEFINITION AND METHODOLOGY

There are many KPIs by which the performance of an electricity utility can be evaluated. To keep the report accessible to a wider audience only a few key KPIs were selected in this report. These selected KPIs provide insights on environmental, social, governance, and financial aspects of the utility. Apart from providing trend analysis, the KPIs can identify areas that may require interventions. The sections below introduce the definitions and the method of calculation for each of the selected KPIs.



Environment

The environmental KPIs focus on the transition towards a clean and low-carbon electricity future of Tamil Nadu. KPIs are introduced to measure the installed generation capacity, the share of renewable energy on the total energy consumption, the uptake of distributed renewable energy sources, the carbon intensity of the state's electricity supply. The extent, to which the utility has met its annual Renewable Energy Purchase Obligation (RPO) indicates its compliance with these regulations. The average procurement cost per unit of renewable energy traces the cost trajectory and affordability of these clean energy sources.

| KPI | Definition | Method of Calculation | Unit |
|---------------------------------|---|---|------|
| Renewable energy capacity share | Renewable energy ³ capacity share indicates to what extent the transition towards a clean electricity network has taken place. It is defined as the percentage share of installed renewable energy capacity to the total installed energy capacity in the state ⁴ . | Total installed renewable energy capacity/Total installed capacity of the State | % |
| Renewable energy penetration | Renewable energy penetration tracks how much of the total electricity generation is sourced from renewables. It is defined as the percentage share of energy generated from renewable sources to the total energy generated in the state. | Total RE generation/Total generation of the State | % |

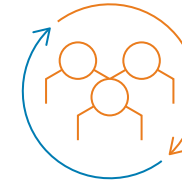
³Renewable Energy sources include wind, solar, hydro, biomass, and bagasse generation.
⁴Since TANGEDCO is the only electric utility in the state of Tamil Nadu, the total capacity of the state is considered as the total capacity of TANGEDCO. This is applied to similar parameters in this report.

| KPI | Definition | Method of Calculation | Unit |
|--|--|---|----------------|
| Distributed renewable energy (DRE) ⁵ capacity share | This indicates the extent of decentralizing power generation on account of DRE. It is defined as the percentage share of installed DRE capacity to the total installed energy capacity in the state. | Total DRE installed capacity / Total installed capacity of the State | % |
| Distributed renewable energy penetration | Tracks the change in energy sourced from DRE and indicates the extent to which DRE sources contribute to meeting the energy generation. It is defined as the percentage share of energy generated from distributed renewable sources to the total energy generated in the state. | Total DRE generation / Total generation of the State | % |
| CO2 emission equivalent to electricity generated | This measures the embedded CO2e emissions per unit of electricity and indicates the progress made towards a low carbon electricity system. | Summation of CO2e emission by generating technologies such as thermal, gas, etc. (Tonnes of CO2e per kWh of energy generation of a technology * number of kWh generated from the corresponding technology) ⁶ | Tonnes of CO2e |
| Renewable energy purchase obligation (RPO) compliance ⁷ | RPOs are a mandated percentage of the total electricity consumption that the utility must source from renewables. The RPO targets are set by the electricity regulatory commission. This KPI tracks to what extent the mandated RPO targets have been met. | Yes or no. % Of RPO met. | - |
| Average cost of power purchase from renewable energy sources | The average cost of power purchase per kWh (including all variable and fixed costs) for the procurement of renewable power by the utility. This KPI serves as an indicator of the cost development of renewable energy. | Average power purchase cost of all the renewable energy technologies (solar, wind, biomass, captive, and co-generation as mentioned in the TNERC tariff order) | |

⁵Distributed Renewable Energy (Auroville Consulting 2019) can be defined with the following parameters: Interconnection at a voltage level below 33 kV, Integration into the existing distribution infrastructure, and Consumption of the energy generated primarily within the local distribution network (i.e., close to the point of consumption)

⁶The fuel emission factors used in this calculation are taken from (Ministry of Power 2021b)

⁷The RPO includes renewable energy sources such as wind, solar, hydro, biomass, and bagasse generation.



Social

The social KPIs include indicators related to electricity subsidies, consumer service quality, and the reliability of supply. The tariff subsidies are contributions from the Government of Tamil Nadu to the low tariff paying consumers. The consumer service quality is determined from the time taken for the utility to act on the consumer complaints and other requirements.

| KPI | Definition | Method of Calculation | Unit |
|--|---|--|------------------------|
| Average State Government subsidy per unit sold | The average tariff subsidy per unit sold is the amount of subsidy received from the Government of Tamil Nadu per kWh sold by the utility. It indicates the overall intensity of the electricity subsidy provided by the state government. | Total electricity subsidy from TN Government in a FY (100%-inflation of the FY%)/Total number of units sold by the utility in the same FY ⁸ | INR/kWh |
| Average domestic subsidy per unit sold | This is to track the average subsidy requirement for a unit delivered to domestic consumers. | Total subsidy to domestic/Total number of units sold | INR/kWh |
| Average agricultural subsidy per unit sold | This is to track the average subsidy requirement for a unit delivered to agricultural consumers. | Total subsidy to agriculture/Total number of units sold | INR/kWh |
| Average tariff subsidy per agricultural service connection | Agriculture accounts for much of the electricity subsidy provided by the State Government. The average annual subsidy amount received per agricultural service connection indicates the intensity of the subsidy provided. | Agricultural Subsidy (100%-inflation of the FY%)/Number of Agricultural Service Connections | INR/Service Connection |

⁸The inflation percentage of each year is considered while calculating the subsidy.



Governance

The Governance KPIs include the aggregate technical and commercial losses (AT&C), power quality, risk awareness, compensation, and gender diversity ratio.

| KPI | Definition | Method of Calculation | Unit |
|--|---|---|---------------------------|
| Average tariff subsidy per domestic service connection | Domestic consumers received an electricity subsidy in the form of lower payable tariff rates. The average annual subsidy amount received per domestic service connection indicates the intensity of the subsidy provided. | Domestic Subsidy (100%-inflation of the FY%)/Number of domestic service connections | INR/ Service Connection |
| Net revenue/ loss per unit | Indicates whether the utility has an overall net revenue gap or gain per unit supplied for each of the existing tariff categories and rates. | Net revenue/loss per unit = Average billing rate + Subsidy from the State Government– Average cost of supply. | INR/kWh |
| Average response time | Indicates the average time taken for giving a new supply, granting an additional load, shifting connection, etc. It is an indicator of customer service quality. | Sum of the time taken ⁹ to provide the service in a FY/ Total Actions Taken in the same FY | Average hours per request |
| Total number of power outage | This gives the total number of power outages in hours per year. It is an indirect measure of customer satisfaction and the reliability of supply. More power outage hours mean less customer satisfaction and less reliability. | Average Power Outage in hours per year | Hours/Year |

⁹The sum of total hours from the time of complaint must be taken, not just the working hours. This is as per (The Gazette of India 2020).

| KPI | Definition | Method of Calculation | Unit |
|--|---|---|-------------------|
| Aggregate technical and commercial losses (AT&C) | AT&C loss is a measure of operational efficiency. A change in AT&C losses will also impact the financial performance of the utility. | The reported value by the utility is taken directly. | % |
| Power quality reliability index | This is to track the reliability of the power supplied. This measures the number of hours the voltage falls below or above the stipulated values continuously and the frequency of the voltage fluctuation. | Hours of fluctuation or falling below the stipulated value as per SAIDI (System Average Interruption Duration Index). And the frequency of the voltage drops below the specified level as per SAIFI (System Average Interruption Frequency Index) ¹⁰ . | Hours and Number |
| Risk awareness | This will track whether the employees are made aware of the workplace safety protocols and tools to avoid accidents. | Percentage of total employees aware of existing workplace safety protocols. | % |
| Compensation | This will track the mode salary ¹¹ of the organisation over the years to check if the employees are compensated appropriately. | Average annual salary of an employee in the last 10 years | INR/Person/ Annum |
| Gender diversity ratio | This will track the gender diversity in the utility organisation. It measures the ratio of female to male employees and indicated gender inclusiveness. | Ratio of female to male employees | Ratio |

¹⁰DISCOMs (Distribution Companies) in Europe use SAIDI and SAIFI for voltage monitoring. The same is prescribed for the state of Tamil Nadu by the Forum of Regulators (CERC 2018).

¹¹The salary includes basic pay, allowances, and remuneration.



Financial

The financial KPIs consist of general financial indicators to track the performance of the utility. Additionally, it consists of the recovery of costs and the break-up of aggregate revenue required.

| KPI | Definition | Method of Calculation | Unit |
|-----------------------------------|--|---|-------|
| Net profit margin (%) | The ratio between profit after tax and the total revenue including the Government of TN subsidy. | Profit after tax / (Total Revenue which includes subsidy from TN Government) | % |
| Ratio of CapEx and depreciation | This is CapEx to the depreciation amount. This ratio indicates the rate at which a distribution utility is adding assets as compared to the depreciation of assets in a particular period | CapEx/depreciation | ratio |
| Debt to equity ratio (D/E) - | The debt-to-equity ratio is an important parameter of financial leverage. Higher debt increases the obligation of interest payment and subsequently affects profitability. It is an important measure as the capital structure is one of the key fundamental considerations in financial management. | (Long term debt + Short term debt) / Net worth | ratio |
| Fixed asset coverage ratio (FACR) | FACR measures the ability of a company to cover its debt obligations with its assets. | Net fixed assets/ Total debt | ratio |
| Debt service coverage ratio | In the context of corporate finance, the debt-service coverage ratio (DSCR) is a measurement of a firm's available cash flow to pay current debt obligations. | (Profit after tax PAT + Depreciation + Interest expense) / (Interest expense + Principal payment due in the year) | ratio |

| KPI | Definition | Method of Calculation | Unit |
|---|--|---|-------|
| Working capital per revenue | A financial strength ratio that measures the proportion of a company's working capital to the company's revenues. Working capital Per revenue displays the amount of working capital that are necessary to generate one INR of sales. The lower the number, the stronger the balance sheet of the company. | (Working Capital / Revenue) | ratio |
| ROE (%) | Return on Equity: It measures the profitability of a corporation in relation to stockholders' equity. The higher the ROE, the more efficient a company's management is at generating income and growth from its equity financing. | Profit after tax/ Net worth | % |
| Ratio of average power purchase cost of renewable energy to the average power purchase cost | Power Purchase Cost of a unit Renewable Energy to the power purchase cost of an average unit of energy. If the number gets lesser than 1, then RE is inferred to be cheaper than the average Power Purchase Cost. | Power Purchase Cost of A unit RE/Power Purchase Cost of an Average unit of Energy | - |
| Recovery of fixed costs | Recovery of fixed costs is determined as the ratio of demand/fixed charges collected from consumers to the fixed costs incurred per unit. A ratio below 1 indicates an under-recovery. | Total demand/fixed charges collected/Total revenue from sales | - |
| Recovery of variable costs | Recovery of variable costs is determined as the ratio of energy charges to the variable cost incurred. A ratio below 1 indicates an under-recovery. | Total energy charges collected/Total revenue from Sales | - |

KEY PERFORMANCE INDICATORS (KPIs)

| KPI | Definition | Method of Calculation | Unit |
|---|--|---|---------|
| Recovery of ARR | The recovery of ARR is determined as a ratio of Revenue to the net ARR. If the ratios are less than 1, they denote under-recovery. 1 is breakeven point. More than 1 is over-recovery. | Total revenue/net ARR | - |
| Revenue earned on the generation assets | This will track the revenue earned per annum per INR of generation assets. | Revenue earned through generation/Generation assets | INR/INR |
| Revenue earned on the distribution assets | This will track the revenue earned per annum per INR of distribution assets. | Revenue earned through distribution/distribution assets | INR/INR |
| Revenue earned on the retail supply | This will track the revenue earned per annum per INR of retail assets. | Total demand/fixed charges collected/Total revenue from sales | - |
| Recovery of variable costs | Recovery of variable costs is determined as the ratio of energy charges to the variable cost incurred. A ratio below 1 indicates an under-recovery. | Revenue earned through retail supply/retail assets | INR/INR |

| | Environment | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 |
|----|---|------------------|---------|---------|---------|---------|---------|
| E1 | Renewable energy capacity share | 39.03% | 34.88% | 35.84% | 37.22% | 39.96% | 49.47% |
| E2 | Renewable energy penetration | 10.80% | 4.27% | 9.16% | 9.84% | 9.92% | N/A |
| E3 | Distributed renewable energy capacity share | 1.25% | 1.38% | 1.87% | 2.07% | 2.13% | 2.06% |
| E4 | Distributed renewable energy penetration | 1.50% | 1.65% | 1.80% | 1.77% | 1.74% | N/A |
| E5 | CO2 emission equivalent to electricity generated (million tonnes of CO2 emission) | 66.14 | 78.33 | 61.13 | 66.68 | 72.79 | N/A |
| E6 | Compliance of Renewable Energy Purchase Obligation ¹² | No ¹³ | No | No | No | No | No |
| E7 | Average cost of power purchase from renewable energy sources (INR/kWh) | 4.16 | 3.36 | 3.94 | 4.26 | 4.26 | N/A |

Sources: Auroville Consulting (2019), Energy Department of Tamil Nadu (2021), Ministry of Power (2021b), and TNERC (2017a)

| | Social | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 |
|----|---|---------|---------|---------|---------|---------|---------|
| S1 | Average State Government subsidy per unit sold (INR/kWh) | 0.92 | 1.01 | 1.15 | 0.95 | 0.87 | N/A |
| S2 | Average domestic subsidy per unit sold (INR/kWh) | 1.12 | 1.29 | 1.80 | 1.40 | 1.10 | N/A |
| S3 | Average agriculture subsidy granted per unit sold (INR/kWh) | 2.77 | 3.06 | 3.07 | 3.07 | 3.59 | N/A |
| S4 | Average domestic subsidy granted per service (INR/Service) | 1,425 | 1,606 | 2,402 | 1,875 | 1,498 | N/A |
| S5 | Average agriculture subsidy granted per service (INR/Service) | 14,584 | 16,168 | 16,195 | 16,545 | 19,454 | N/A |

¹²The Tamil Nadu Government Gazette released the newly amended Renewable Energy Purchase Obligation of the state (Tamil Nadu Government Gazette 2020). In none of the years since 2014-15 until 2019-20 did Tamil Nadu met its RPO targets. The quantum of power purchase from renewable and other sources are taken from TNERC (2017a).

¹³The details of the Renewable Energy Purchase Obligation are in the Annexure.

| | Social | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 |
|----|------------------------------------|---------|---------|---------|---------|---------|---------|
| S6 | Average response time | N/A | N/A | N/A | N/A | N/A | N/A |
| S7 | Total number of power outage hours | N/A | N/A | N/A | N/A | N/A | N/A |

NET REVENUE/LOSS PER UNIT (INR/kWh)

| S8 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 |
|-----------------|---------|---------|---------|---------|---------|
| HT I-A | 0.11 | 0.95 | 1.19 | 0.66 | -2.15 |
| HT I-B | -0.22 | 0.29 | 0.14 | 0.00 | -1.06 |
| HT II-A | -1.11 | 0.63 | 0.04 | -0.13 | -1.90 |
| HT II-B | 0.13 | 1.06 | 0.49 | 0.34 | -0.26 |
| HT III | 4.61 | 5.64 | 4.19 | 2.20 | -0.36 |
| HT IV | -2.73 | 0.73 | -0.79 | -1.36 | -8.04 |
| HT V | 3.63 | 7.37 | 5.32 | 3.63 | 5.55 |
| HT | 0.49 | 1.50 | 1.43 | 0.79 | -1.75 |
| LT I-A | -3.52 | -2.99 | -3.12 | -3.91 | -4.13 |
| LT I-B | -2.85 | -3.72 | -4.30 | -4.73 | N/A |
| LT I-C | -2.67 | -2.61 | -2.95 | -3.16 | -5.79 |
| LT II-A | -1.55 | -0.26 | -0.64 | -0.81 | -2.60 |
| LT II-B(1) | -1.38 | -0.42 | -0.69 | -0.87 | -6.25 |
| LT II-B(2) | -0.05 | 1.13 | 0.83 | 0.63 | -0.89 |
| LT II-C | -1.06 | -0.44 | -0.36 | -0.30 | -1.44 |
| LT III-A(1) | -2.68 | -2.46 | -2.68 | -2.65 | -5.01 |
| LT III-A(2) | -2.01 | -1.09 | -0.70 | -0.69 | -2.74 |
| LT III-B | -1.06 | -0.17 | -0.53 | -0.90 | -2.90 |
| LT IV | -4.45 | -4.10 | -4.43 | -4.64 | -4.45 |
| LT V | 0.51 | 1.63 | 1.81 | 1.04 | -1.90 |
| LT VI | 6.37 | 6.93 | 11.36 | 13.02 | 1.27 |
| LT | -2.74 | -2.09 | -2.17 | -2.59 | -3.53 |
| Total HT and LT | -1.97 | -1.24 | -1.30 | -1.72 | -3.05 |

Sources: TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017a), TNERC (2017b), TNERC (2018), TNERC (2019), and TNERC (2020)

| | Governance | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 |
|----|---------------------------------|---------|---------|---------|---------|---------|---------|
| G1 | AT&C Loses % | 16.00% | 15.60% | N/A | N/A | N/A | N/A |
| G2 | Power Quality Reliability Index | N/A | N/A | N/A | N/A | N/A | N/A |
| G3 | Risk Awareness | N/A | N/A | N/A | N/A | N/A | N/A |
| G4 | Compensation | N/A | N/A | N/A | N/A | N/A | N/A |
| G5 | Gender diversity ratio | N/A | N/A | N/A | N/A | N/A | N/A |

Sources: TNERC (2017a)

| | Financial | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 |
|-----|---|---------|---------|---------|---------|---------|---------|
| F1 | Net profit margin (%) | -38.31% | -17.99% | -13.43% | -15.50% | -18.20% | -16.34% |
| F2 | Ratio of CapEx and depreciation | 5.99 | 5.17 | 5.24 | 5.38 | N/A | N/A |
| F3 | Debt to equity ratio (D/E) - | N/A | -0.71 | -0.54 | -0.59 | -2.01 | -2.00 |
| F4 | Fixed asset coverage ratio (FACR) | N/A | 0.74 | 0.91 | 0.74 | 0.81 | 0.80 |
| F5 | Debt service coverage ratio | -0.42 | 0.32 | 0.49 | 0.24 | N/A | N/A |
| F6 | Working capital per revenue | -0.41 | -0.30 | -0.25 | -0.20 | -0.39 | -0.55 |
| F7 | ROE% | -43% | -12% | -10% | -13% | -15% | -13% |
| F8 | Ratio of average power purchase cost of renewable energy to the average power purchase cost | 1.00 | 0.74 | 0.92 | 1.04 | 1.03 | N/A |
| F9 | Recovery of fixed costs (%) | 45% | 49% | 47% | 50% | 41% | N/A |
| F10 | Recovery of variable costs (%) | 87% | 92% | 101% | 104% | 85% | N/A |
| F11 | Recovery of ARR (%) | 74% | 79% | 83% | 86% | 71% | N/A |
| F12 | Revenue earned on the generation assets | N/A | N/A | N/A | N/A | N/A | N/A |
| F13 | Revenue earned on the distribution assets | N/A | N/A | N/A | N/A | N/A | N/A |
| F14 | Revenue earned on the retail supply | N/A | N/A | N/A | N/A | N/A | N/A |

Sources: TANGEDCO (2021) and TNERC (2017a)

KEY INSIGHTS

Key insights to all the indicators are given below. Indicators from the environmental, social, and governance highlight the contrast in the category . With respect to the environmental indicators, though there is an increasing trend in renewable energy capacity and penetration, there is also an increase in carbon dioxide equivalent emissions. Also, the Renewable Energy Purchase Obligation is not met by the State. With respect to the social indicators, the overall subsidy granted per unit is reducing. However, the subsidy per unit and per service connection of agriculture is increasing. For domestic, the subsidy per unit is decreasing while the subsidy per service is increasing. Certain categories under LT are incurring a loss in spite of the Government subsidy.

The financial indicators clearly show the need for improvement.

ENVIRONMENT

- E1 - Renewable energy capacity share: The installed capacity of renewable energy as a percentage of total capacity decreases from FY 2014-15 to FY 2015-16 and then increases till FY 2018-19. It grew by 44% between the FY 2014-15 and FY 2018-19.
- E2 - Renewable energy penetration: The share of renewable energy as a percentage of total generation decreases from FY 2014-15 till FY 2015-16 and then increases till FY 2018-19. This is an increase of 24%.
- E3 - Distributed renewable energy capacity share: The installed capacity of distributed renewable energy as a percentage of total capacity steadily grew by 139% from FY 2014-15 to FY 2018-19.
- E4 - Distributed renewable energy penetration: The generation of distributed renewable energy as a percentage of total generation steadily increased from FY 2014-15 till FY 2018-19. This is an increase of 56% between these FYs.
- E5 - CO2 emission equivalent to electricity generated: The CO2 emissions equivalent for electricity generated has increased from 64 million tonnes in FY 2014-15 to 72.79 million tonnes in FY 2018-19. This is a 10.05% increase (Appendix 2).
- E6 - Compliance of Renewable Energy Purchase Obligation: It was found that in none of the financial years in the last 5 years did TANGEDCO complied with the Renewable Energy Purchase Obligation (RPO). As per the approved power purchase quantum of renewable energy and conventional energy by (TNERC 2017a), TANGEDCO did not comply with the RPO (Appendix 2).
- E7 - Average cost of power purchase from renewable energy sources: The average power purchase cost in INR/kWh of renewable energy has increased by 2% from FY 2014-15 till FY 2018-19.

SOCIAL

- S1 - Average State Government subsidy per unit sold: The overall subsidy per unit decreases from INR 0.92/kWh in FY 2014-15 to INR 0.87/kWh in FY 2018-19 which is a decrease of 6%.
- S2 - Average domestic subsidy per unit sold: The domestic subsidy per unit decreases from INR 1.12/kWh in FY 2014-15 to INR 1.10/kWh in FY 2018-19 which is a decrease of 1%.
- S3 - Average agriculture subsidy granted per unit sold: The agricultural subsidy per unit increases from INR 2.77/kWh in FY 2014-15 to INR 3.59/kWh in FY 2018-19 which is an increase of 30%.
- S4 - Average domestic subsidy granted per service: The domestic subsidy per service increases from INR 1425.06 in FY 2014-15 to INR 1498.18 in FY 2018-19 which is an increase of 5%.
- S5 - Average agriculture subsidy granted per service: The agricultural subsidy per service increases from INR 14,584 in FY 2014-15 to INR 19,454 in FY 2018-19 which is an increase of 33%.
- S6 - Average response time: Data not available.
- S7 - Total number of power outage hours: Data not available.
- S8 - Net revenue/loss per unit: All the categories in HT are earning a net positive revenue except HT IV Lift Irrigation.
- The below LT categories are incurring a loss despite the subsidy (Government of Tamil Nadu) and cross-subsidies:
 - LT I-A
 - LT I-B
 - LT I-C
 - LT-IV

GOVERNANCE

- G1 - AT&C Losses: Data not available
- G2 - Power Quality Reliability Index: Data not available
- G3 - Risk Awareness: Data not available
- G4 – Compensation: Data not available
- G5 - Gender diversity ratio: Data not available

FINANCE

- F1 - Net profit margin: The net profit margin is negative for all the years since FY 2014-15 up until FY 2019-20. This means revenue earned by TANGEDCO is not enough to cover its expenditure.
- F2 - Ratio of CapEx and depreciation: The ratio of CapEx and depreciation is around 5 for all the financial years. The capital expenditure being 5 times more than the depreciation indicates the growth in the asset base of TANGEDCO.
- F3 - The debt-equity ratio is negative for all the financial years. This is because the liabilities of TANGEDCO on any financial year are more than the assets. This makes the net assets/net worth of TANGEDCO negative. Adding to this, the total debt of TANGEDCO is increasing since FY 2014-15 up until FY 2019-20.
- F4 - Fixed asset coverage ratio: The FACR is below 1 for all the financial years. A value below 1 indicates that the total fixed assets of TANGEDCO are below the total debt. A FACR value of 0.8 means TANGEDCO could cover only 80% of its debt by liquidating the fixed assets.
- F5 - Debt service coverage ratio: The debt service coverage ratio of TANGEDCO is below 1. This indicates that TANGEDCO is not generating sufficient operating income to cover its annual debt and interest payments. There is no sufficient operating income for TANGEDCO because it accumulated losses in every financial year since FY 2014-15 up until FY 2019-20.
- F6 - Working capital per revenue: The working capital per revenue for TANGEDCO is negative since FY 2014-15 up until FY 2019-20, because the current liabilities are more than current assets. A value of -0.55 means, TANGEDCO loses 55 paise to generate a revenue of 1 rupee.
- F7 - ROE%: The ROE% is negative for TANGEDCO as there is no profit since 2014-15 up until FY 2019-20. Although the ROE% is improving in the recent financial years.
- F8 - Ratio of average power purchase cost of renewable energy to the average power purchase cost: The average power purchase cost of renewables is at par with the power purchase cost of conventional energy except for the FY 2015-16 and 2016-17.
- F9 - Recovery of fixed costs: The demand/fixed charges recovering the fixed costs are in the range of 41% to 50% from FY 2014-15 till FY 2018-19.
- F10 - Recovery of variable costs: Between the FYs of 2014-15 till FY 2018-19, the energy charges recovering the variable costs are in the range of 85% to 104%.
- F11 - Recovery of ARR: It is to be noted that the fixed costs were always under-recovered, while variable costs were almost recovered. Because of the under-recovery of the fixed costs, the ARR is also under-recovered. Between the FYs of 2014-15 till FY 2018-19, the ARR recovered is in the range of 71% to 86%.
- F12 – Revenue earned on the generation assets: Data not available
- F13 – Revenue earned on the distribution assets: Data not available
- F14 – Revenue earned on the retail supply: Data not available

CONCLUSIONS & RECOMMENDATIONS

One of the recommendations of the International Energy Agency (IEA) to the Government of India is to strengthen the monitoring of the energy sector, which include improving the collection, consistency, transparency, and availability of energy data across the energy system at the central and state government levels. An open data policy and transparency are important for monitoring. Similarly, the National Data Sharing and Accessibility Policy (NDSAP) promotes data sharing and enables access to Government of India-owned data for national planning and development (The Gazette of India 2012). The utility is owned by the public. So it should ensure data transparency to gain the confidence of the public. This report also shares similar views and recommendations.

Data transparency, availability, and accessibility

There were many challenges in consolidating the open data available from various government departments for this report. Some of the challenges in collecting the data include the absence of data, missing data for certain time periods, and incompatible formats of the data.

Some of the proposed KPIs could not be computed due to the absence of publicly available data. Important data sets that could not be identified are listed below.

- Risk Awareness
- Compensation
- Power Quality Reliability Index
- Time taken for giving a new supply/Additional Load/load shifting of connection
- Total Number of Power Outage Hours
- Frequency and Voltage Complaints

There is also a lack of timely reporting of the balance sheets and profit/loss statements to the public. The website of TANGEDCO must enable the viewing of such statements online all at once for the public evaluate the financial health of TANGEDCO across the financial years.

Data related to the KPIs under Governance would be relatively new for TANGEDCO to start reporting. But this would help TANGEDCO track its own performance and help to set new targets. Consumers of electricity do have a portal to raise their complaints related to the power supply (Ministry of Power 2021a). Also, Tamil Nadu Electricity Regulatory Commission (TNERC) gave regulations for consumer grievance redressal (TNERC 2004). The Energy Department of Tamil Nadu (Energy Department 2020) stipulated the maximum duration to be taken to redress the complaints. As the number of complaints received versus the complaints redressed and the time taken for redressal is not available publicly the KPI on 'Frequency and Voltage Complaints' could not be computed. Filling these data gaps might bring in more transparency and improve customer services.

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APPENDIX 1

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Tariff Categories

| | | |
|---------------------|------------------------------|--|
| HT I-A | High Tension Tariff I-A | Industries, Registered factories, Textiles, Tea estates, IT services, and start-up power provided to generators, etc. |
| HT I-B | High Tension Tariff I-B | Railway Traction |
| HT II-A | High Tension Tariff II-A | Govt. and Govt. aided Educational Institutions and hostels, Government Hospitals, Public Lighting and Water supply, Actual places of public worship etc. |
| HT II-B | High Tension Tariff II-B | Private Educational Institutions & Hostels |
| HT III | High Tension Tariff III | Commercial and all other categories of consumers not covered under HT-I-A, I-B, II-A, II-B, IV and V |
| HT IV | High Tension Tariff IV | Lift Irrigation societies for Agriculture registered under Co-op Societies or under any other Act. (Fully subsidised by the Govt.) |
| HT V | High Tension Tariff V | HT Temporary Supply for construction and other temporary purposes |
| LT I-A | Low Tension Tariff I-A | Domestic, Handloom, Old age homes, Consulting rooms, Nutritious Meals Centres etc. |
| LT I-B | Low Tension Tariff I-B | Huts in Village Panchayats, TAHDCO etc. |
| LT I-C | Low Tension Tariff I-C | Bulk Supply |
| LT II-A | Low Tension Tariff II-A | Public Lighting and Public Water Supply & Sewerage |
| LT II-B (1) | Low Tension Tariff II-B (1) | Govt. Educational Institutions., Hospitals, Water supply etc. |
| LT II-B (2) | Low Tension Tariff II-B (2) | Private Educational Institutions, Cinema theatre & Studios |
| LT II-C | Low Tension Tariff II-C | Actual place of public worship, Mutts and Religious Institutions |
| LT III-A (1) | Low Tension Tariff III-A (1) | Cottage and Tiny Industries |
| LT III-A (2) | Low Tension Tariff III-A (2) | Power loom |
| LT III-B | Low Tension Tariff III-B | Coffee grinding and Ice factories etc. and Industries not covered under LT Tariff III-A |
| LT IV | Low Tension Tariff IV | Agriculture and Govt. seed farm etc. |
| LT V | Low Tension Tariff V | Commercial and all categories not covered under I-A, I-B, I-C, II-A, II-B (1), II-B (2), II-C, III-A(1), III-A(2), III-B and IV |
| LT VI | Low Tension Tariff VI | Temp. supply (a) Lighting and combined installations, (b) Lavish illuminations |

APPENDIX 2

Compliance of Renewable Energy Purchase Obligation

| SI No | Minimum Quantum of total renewable purchase obligation in percentage (in terms of energy in kWh) | Quantum of power purchase (MU) | Quantum of power purchase from renewable energy (MU) | % Of Quantum of total renewable purchase | Shortfall | RPO Compliance met |
|---------|--|--------------------------------|--|--|-----------|--------------------|
| 2015-16 | 9.50% | 81,879.07 | 3,495.62 | 4.27% | 5.23% | No |
| 2016-17 | 11.50% | 88,849.02 | 8,136.27 | 9.16% | 2.34% | No |
| 2017-18 | 14.00% | 97,903.15 | 9,636.40 | 9.84% | 4.16% | No |
| 2018-19 | 14.00% | 1,05,873.62 | 10,503.29 | 9.92% | 4.08% | No |

Reference: TNERC (2017a) and Tamil Nadu Government Gazette (2020)



MONITORING
KEY PERFORMANCE
INDICATORS
(KPIs) OF TANGEDCO