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# TANGEDCO'S CARBON EMISSIONS FROM 2017 to 2022

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## Introduction

The purpose of this note is to establish a distribution licensee-specific CO<sub>2</sub> emission tracking. The information in this report relies on the power plant-wise CO<sub>2</sub> database from the Central Electricity Authority (CEA 2022) for the fiscal years spanning from 2017-2018 to 2020-21. We anticipate that this document will serve as a readily accessible reference for policymakers, grid operators, organizations obligated to disclose their Scope 2 CO<sub>2</sub> emissions.

## Key messages

- In 2022, fossil fuel-derived energy sources constituted 71% of TANGEDCO's overall energy supply.
- Out of the 25,341 MU increase in power demand between 2017 and 2022, 65% was fulfilled through the generation of energy from fossil fuels.
- TANGEDCO experienced a 33% rise in absolute annual CO<sub>2</sub> emissions from 2017 to 2022. CO<sub>2</sub> emissions from lignite-based power plants more than doubled during this period. The weighted average emission factor for TANGEDCO's power  $bcap\_qcb$  from 0.76 tCO<sub>2</sub>/MWh to 0.75 tCO<sub>2</sub>/MWh.
- In the fiscal year 2021-22, the weighted average emission factor of 0.75 tCO<sub>2</sub>/MWh for TANGEDCO's power surpassed the national average of 0.72 tCO<sub>2</sub>/MWh in the same year.

## ENERGY SOURCES

### Fossil-based energy continues to be the predominant energy source of TANGEDCO

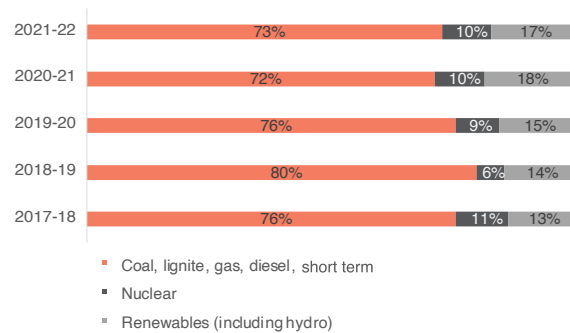
Coal and lignite served as the primary sources of power for TANGEDCO from fiscal year 2017-18 to the fiscal year 2021-22. Collectively, fossil fuel-based energy constituted 76% of the total energy in fiscal year 2017-18, experiencing a slight decrease to 73% in fiscal year 2021-22.

Table 1 Procurement by fuel type (GWh/year)

By fuel type	2017-18	2018-19	2019-20	2020-21	2021-22
Coal	37,028	41,513	34,644	28,702	38,656
Short term/others	12,506	24,077	28,481	24,929	23,200
Lignite	4,812	8,568	6,309	6,768	10,519
Gas	2,985	3,355	2,924	2,174	1,456
Diesel	0	0	0	0	0
Nuclear	8,145	5,573	8,631	8,958	10,129
Hydro	3,041	5,451	4,944	5,365	5,493
Wind	3,428	3,912	3,841	3,735	3,538
Solar	2,904	3,556	4,947	6,115	7,203
Biomass	369	378	313	302	364
<b>Total</b>	<b>75,218</b>	<b>96,383</b>	<b>95,035</b>	<b>87,049</b>	<b>1,00,559</b>

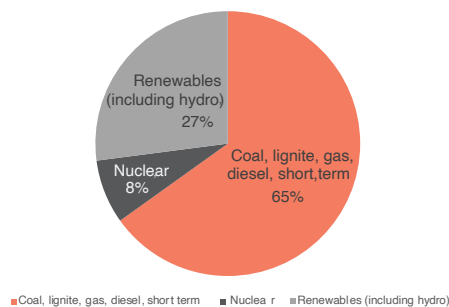
Note: short term and others counted as a fossil fuel-based energy source with an average emission factor of coal power.

Figure 1 Procurement by fuel category (percentage share/year)



The power demand witnessed an increase of 25,341 GWH from 2017 to 2022, with renewables accounting for 27% of this increased demand. With 65% fossil fuel base-energy generation accounted for the majority of the power demand increase.

Figure 2 Increase in power demand by fuel source (percentage share)



## CO2 EMISSIONS BY FUEL TYPE

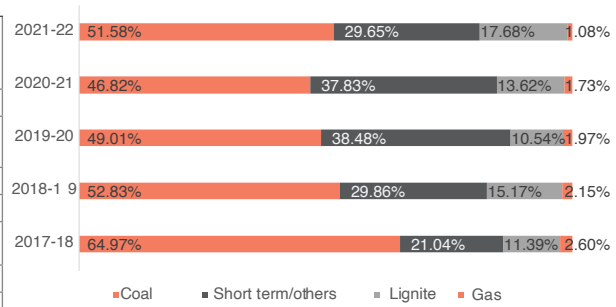
### Emissions from Coal and Lignite show an increasing trend and have exceeded pre-COVID-19 levels.

TANGEDCO's absolute CO2 emissions rose from 570 million tonnes of CO2 in the fiscal year 2017-2018 to 757 million tonnes of CO2 in the fiscal year 2021-22, indicating a 33% increase in CO2 emissions. Lignite-based power, known for its higher emission intensity compared to coal, experienced a significant surge, its total CO2 emission more than doubled between the fiscal year 2017-18 and the fiscal year 2021-22. In the fiscal year 2021-22, it constituted 17.68% of TANGEDCO's total CO2 emission. Despite this substantial increase in lignite usage, coal-fired power generation remains the primary contributor to TANGEDCO's overall CO2 emissions, while emissions from gas power plants remain marginal.

Table 2 CO2 emissions by fuel type (TCO2/year)

By fuel type	2017-18	2018-19	2019-20	2020-21	2021-22
Coal	3,70,71,987	4,11,00,241	3,48,38,332	2,92,83,052	3,90,45,197
Short term/ others	1,20,03,772	2,32,29,846	2,73,51,039	2,36,65,621	2,24,46,411
Lignite	65,00,828	1,18,01,698	74,91,044	85,21,995	1,33,84,554
Gas	14,82,392	16,69,639	14,03,206	10,79,292	8,19,682
Diesel	0	0	0	0	0
Nuclear	0	0	0	0	0
Hydro	0	0	0	0	0
Wind	0	0	0	0	0
Solar	0	0	0	0	0
Biomass	0	0	0	0	0
<b>Total</b>	<b>5,70,58,978</b>	<b>7,78,01,425</b>	<b>7,10,83,621</b>	<b>6,25,49,960</b>	<b>7,56,95,844</b>

Figure 3 Share of CO2 emissions by fuel source (percentage share)



## CO2 EMISSIONS INTENSITY

### Fossil-based energy continues to be the predominant energy source

The weighted average emission factor for TANGEDCO's power experienced a slight decrease from fiscal year 2017-18 to 2021-22, shifting from 0.76 tCO2/MWh to 0.75 tCO2/MWh. This indicates a 0.77% reduction in emission intensity. However, when compared to the weighted average emission factor of India (CEA 2022) at 0.72 tCO2/MWh in the fiscal year 2021-22, TANGEDCO's emission factor remains higher. Lignite, with an emission factor of 1.27 tCO2/MWh, stands out as the most emission-intensive energy-sourcing option for TANGEDCO.

Figure 4 TANGEDCO weighted average emission factor (tCO2/MWh)

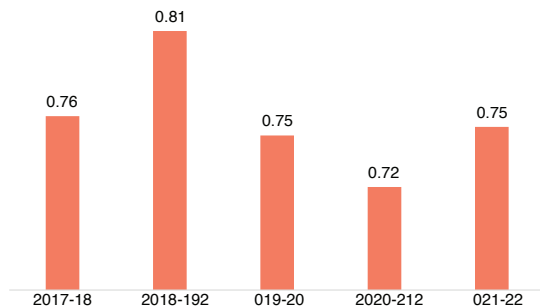


Table 3 Comparison of weighted average emission factor (tCO2/MWh)

Comparison	2017-18	2018-19	2019-20	2020-21	2021-22
India	0.75	0.74	0.71	0.70	0.72
Tamil Nadu	0.76	0.81	0.75	0.72	0.75

Table 4 Emission factor by fuel source (tCO2/MWh)

By fuel type	2017-18	2018-19	2019-20	2020-21	2021-22
Coal	1.00	0.99	1.01	1.02	1.01
Short term/others	0.96	0.96	0.96	0.95	0.97
Lignite	1.35	1.38	1.19	1.26	1.27
Gas	0.50	0.50	0.48	0.50	0.56

## Recommendation:

### Mandate CO2 emission disclosure of distribution licensees.

Requiring electricity utilities to disclose and report their CO2 emissions is imperative for achieving the state's net zero emission targets. Transparent reporting catalyses informed decision-making among consumers, policymakers, and investors. The Energy Department may mandate the disclosure of distribution licensees' specific CO2 emissions. A framework from this can be adopted from the methodology deployed by the Central Electricity Authority in its CO2 Baseline Database for the Indian Power Sector.

### Set emission reduction targets for distribution licensees.

Policymakers, armed with accurate information about emission sources, volume, and intensities, can formulate targeted regulations and incentives to accelerate the transition to a low-carbon future. Establishing emission reduction targets for electricity utilities is pivotal in mitigating climate change. These targets provide a clear roadmap for a transition towards a net zero emission future. Rigorous targets propel utilities to prioritize renewable energy integration, thereby driving systemic change.

**Phase out the most polluting power plants.**

3.10 GW of the State's coal power plants, aged 20 years and older, are nearing the end of their operational life. These plants, characterized by low efficiency and high pollution levels, fail to meet the emission standards set by the Ministry of Environment, Forests, and Climate Change for air and water. Retrofitting to comply with these norms would incur substantial costs, potentially resulting in elevated electricity tariffs. Conducting a cost-benefit analysis that explores alternatives such as repurposing or retrofitting both old and new coal power plants would offer a clearer understanding of the necessity and associated expenses and will provide a road map to phase out the most polluting power plants.

**References:**

1. Ashish Fernandes & Harshit Sharma. TANGEDCO's Recipe for Recovery. Climate Risk Horizons. December 2020. Available at <https://climateriskhorizons.com/research/TANGEDCOs-Recipe-for-Recovery.pdf> (accessed on 6th December 2023)
2. Central Electricity Authority. 2022. CO2 Baseline Database for the Indian Power Sector. User Guide .Version 18. December 2022. Available at: [https://cea.nic.in/wp-content/uploads/baseline/2023/01/Approved\\_report\\_emission\\_\\_2021\\_22.pdf](https://cea.nic.in/wp-content/uploads/baseline/2023/01/Approved_report_emission__2021_22.pdf) (accessed on 5th December 2023).