

Trend Analysis of GHG Emissions of TAMIL NADU

GHG Platform India is a civil society initiative providing an independent estimation and analysis of India's Greenhouse Gas (GHG) emissions across key sectors.

The Platform aims to add value to the various ongoing GHG emissions estimation efforts by addressing existing data gaps and data accessibility issues, broadening the scope of national inventories to include state inventories, and increasing the volume of analytics and policy dialogue on India's GHG emissions sources, profile, and related policies.

The initiative estimates and assesses GHG emissions and removals from the following sectors:



ENERGY



IPPU*



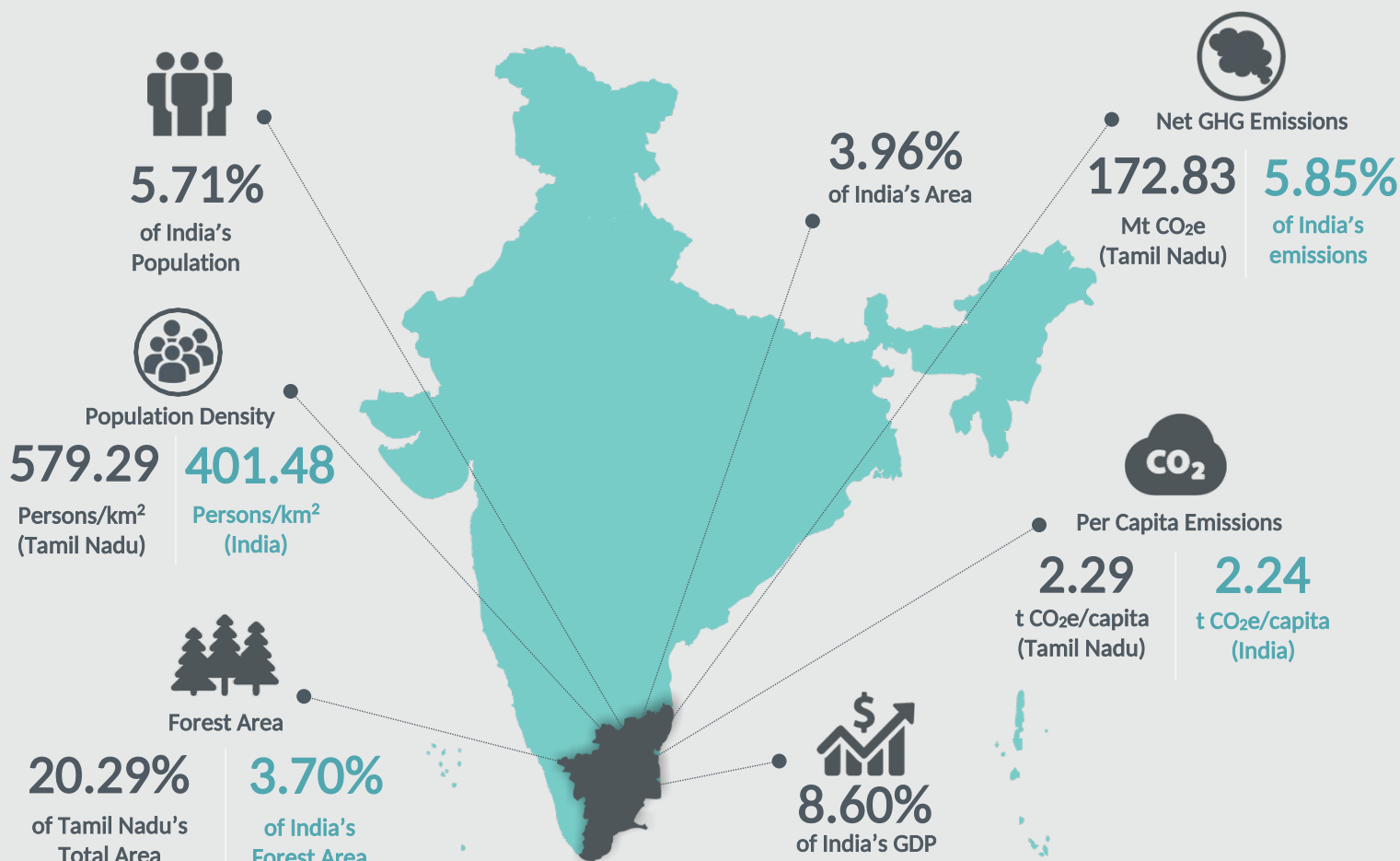
AFOLU



WASTE

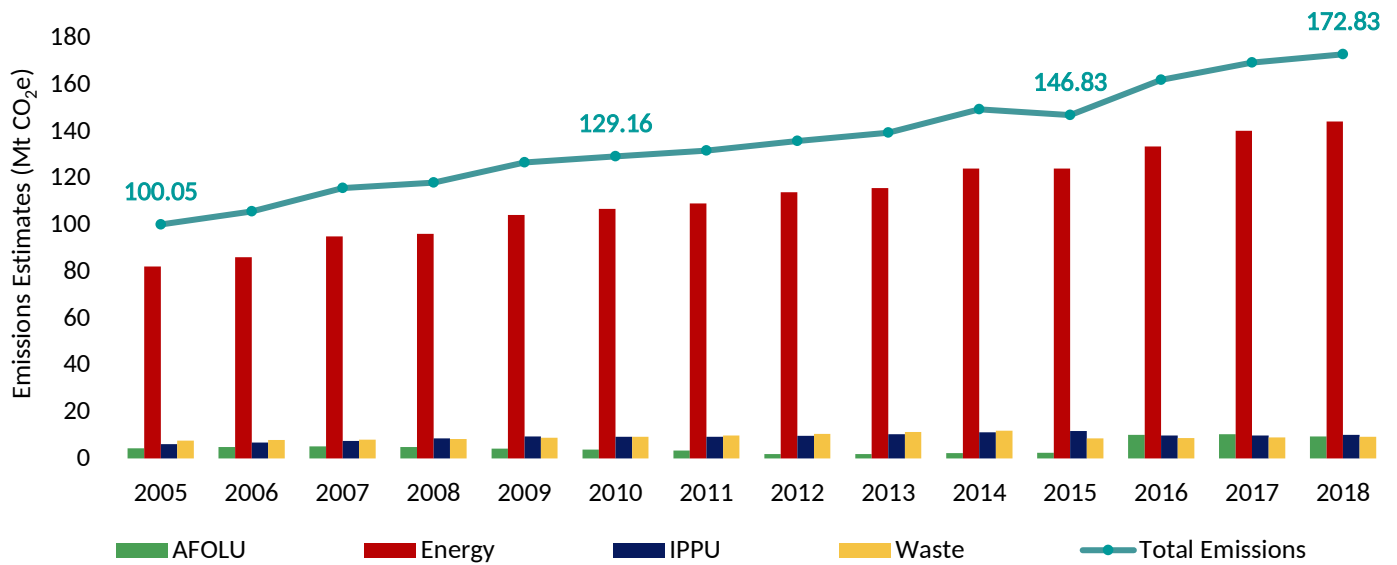
*Fuel combusted for captive electricity generation (auto-producers) and direct fuel combustion (industrial energy) has been reported under Energy sector.

Tamil Nadu at a Glance (2018)



Economy-wide Emissions Estimates

Figure 1: GHG Emissions Estimates of Tamil Nadu (2005 to 2018)



Emissions of Tamil Nadu increased at a CAGR of 4.29% from 100.05 Mt CO₂e in 2005 to 172.83 Mt CO₂e in 2018 (Figure 1). The Energy sector's increased emissions were the primary cause of Tamil Nadu's rapid increase in emissions. In Tamil Nadu's total economy-wide emissions in 2005, the Energy sector accounted for ~82% of total emissions. Waste, Industrial Processes and Product Use (IPPU), and Agriculture, Forestry and Other Land Use (AFOLU) accounted for ~4%, ~6%, and ~8%, respectively, of the total emissions. As shown in Figure 2 below, in 2018, the share of emissions from the Energy and AFOLU sectors increased to ~83% and 6%, respectively. The IPPU sector's share remained the same and while that of Waste sector decreased to ~5%.

Figure 2: Sector-wise Contribution (Mt CO₂e) and Percentage Share in Economy-wide GHG Emissions of Tamil Nadu

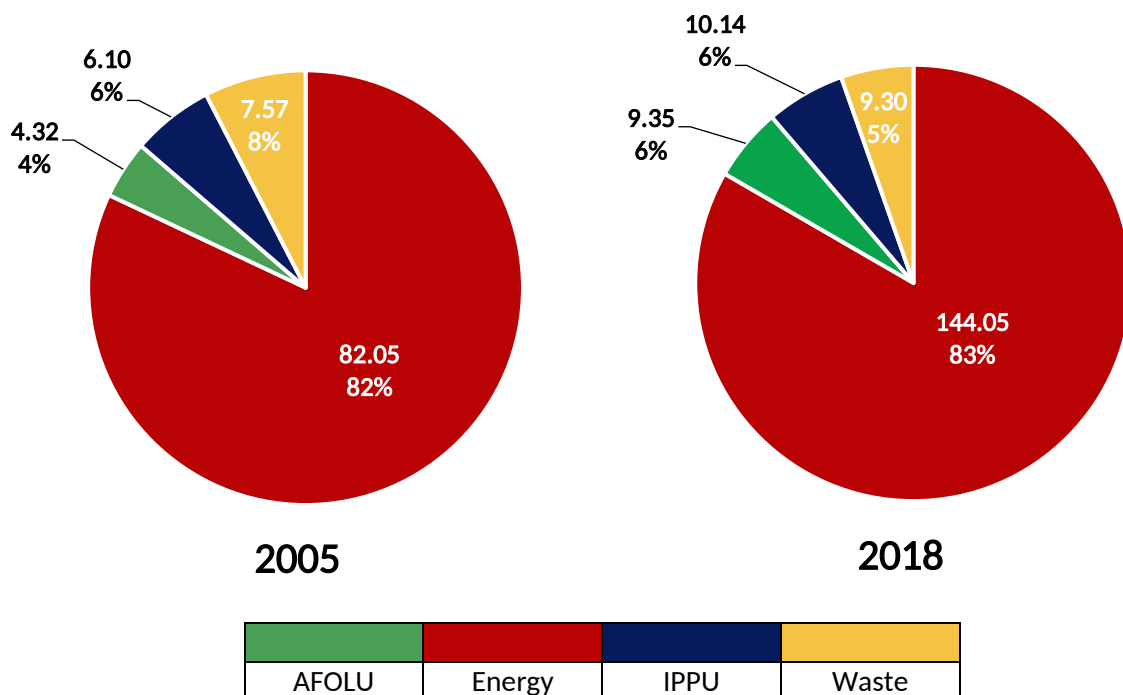
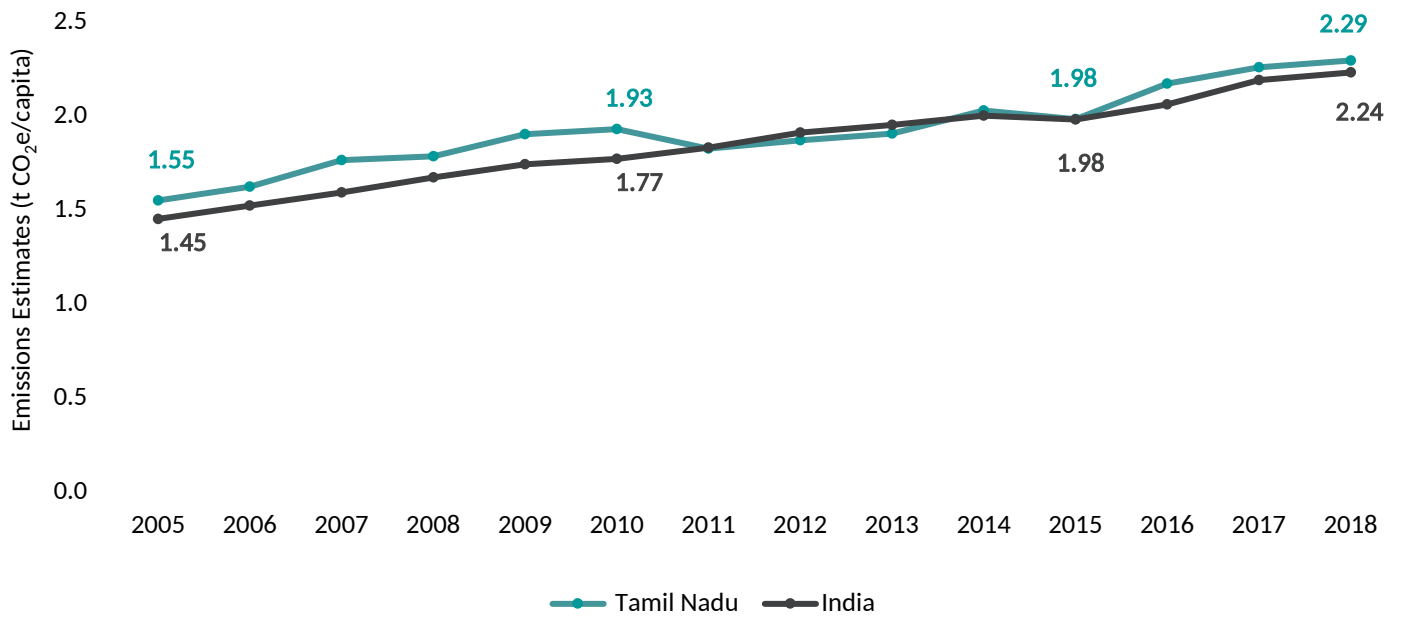


Figure 3: Per Capita GHG Emissions of Tamil Nadu and India (2005 to 2018)



The per capita emissions of Tamil Nadu were slightly higher than the per capita emissions of India through most of the reference period, as inferred from Figure 3. These increased at a compounded rate of 3.07% from 1.55 t CO₂e/capita in 2005 to 2.29 t CO₂e/capita in 2018, which was slightly lower than that of India's CAGR (~3.41%).

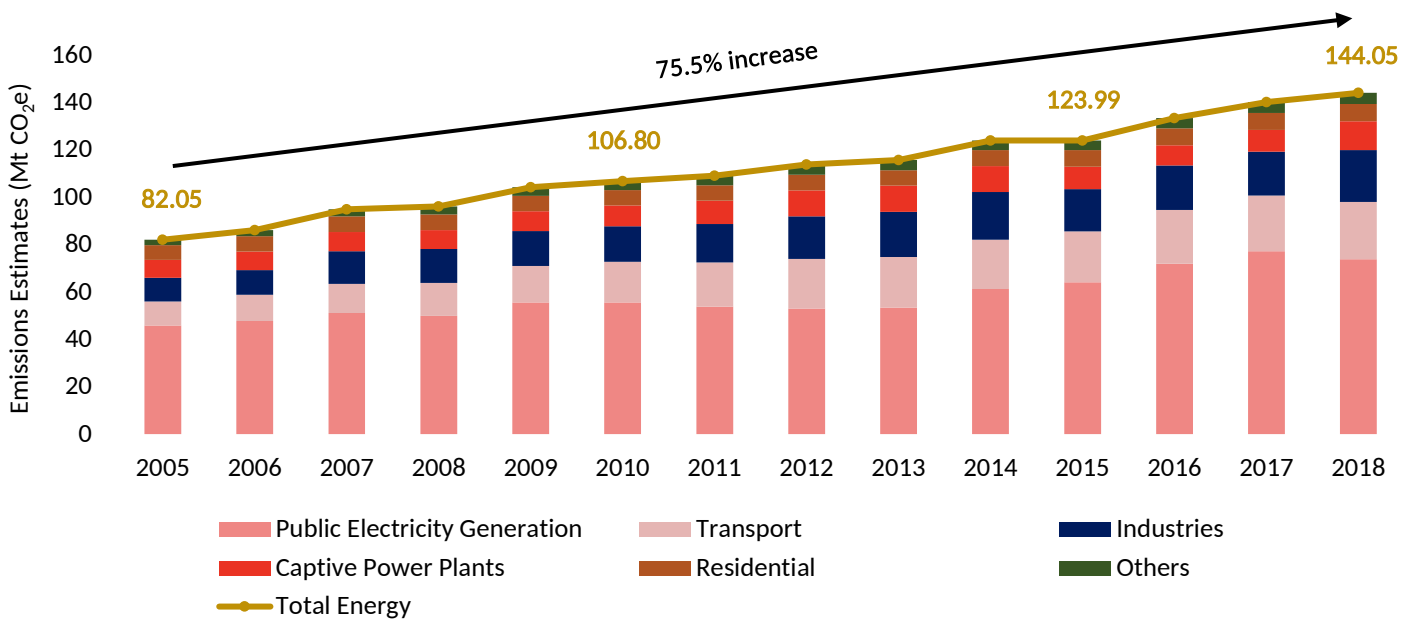


Energy Sector

The Energy sector emissions comprise of emissions from Fuel Combustion and Fugitive Emissions. Fuel Combustion includes emissions from Public Electricity Generation, Transport, Captive Power Plants, Industries, Agriculture, Commercial, and Residential categories. Fugitive Emissions are due to Fuel Production.

The Energy sector of Tamil Nadu accounted for 83% of the economy-wide emissions in 2018. Emissions from the Energy sector increased at a CAGR of 4.42% from 82.05 Mt CO₂e in 2005 to 144.05 Mt CO₂e in 2018 (see Figure 4).

Figure 4: GHG Emissions Estimates of Energy Sector - Tamil Nadu (2005 to 2018)



Within the Energy sector, Public Electricity Generation (PEG) category was the major contributor of GHG emissions with a share of ~52% of the total Energy emissions in 2018. This was followed by Transport and Industrial Energy categories at ~17% and ~15%, respectively (see Figure 5).

Within the Fuel Combustion sub-sector, emissions from Coal were the major contributor, with an average share of ~64%, across the reference period (see Figure 6). This was followed by emissions from combustion of Liquid Petroleum Fuels and Gaseous Petroleum Fuels with an average share of ~28% and ~7%, respectively, between 2005 and 2018.

Figure 5: Category-wise Emissions (Mt CO₂e) and Percentage Share in Total Energy Sector Emissions (2018)

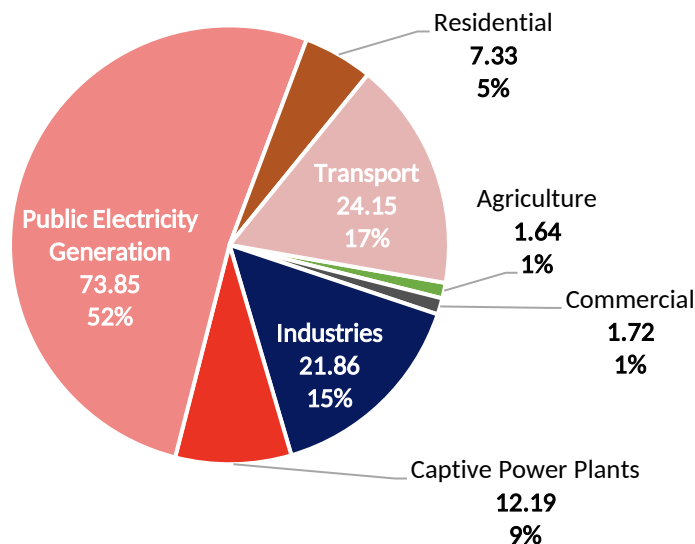
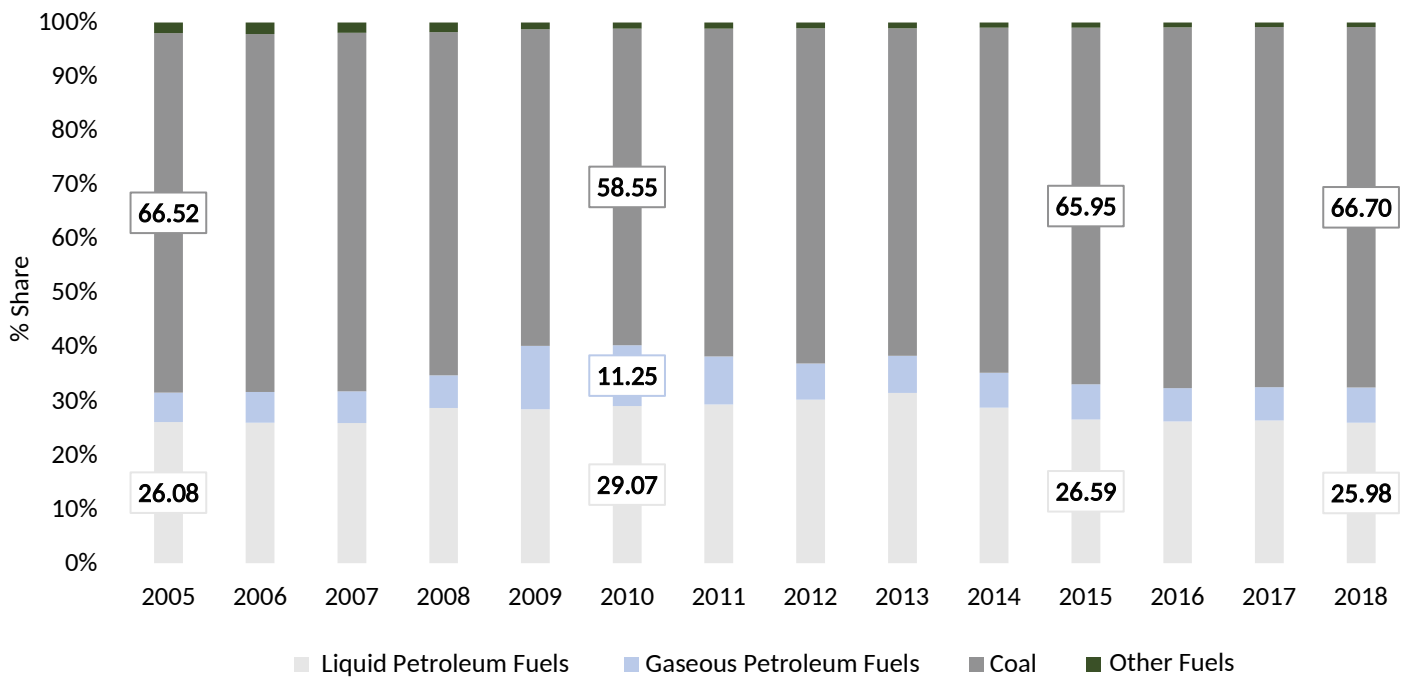


Figure 6: Percentage Share of GHG Emissions by Fuel Type due to Fuel Combustion in Energy Sector* (2005 to 2018)



***Notes:**

1. Coke is included in Coal because the bifurcation of pet-coke and coke was not available
2. Gaseous Fuels - natural gas, LPG and other gaseous fuels
3. Liquid Petroleum Fuels - ATF, diesel, kerosene, motor spirit and other liquid fuels
4. Other Fuels comprises of firewood and charcoal



IPPU Sector

Emissions from the Industrial Processes and Product Use (IPPU) sector are largely driven by Chemical, Metal, Mineral Industries and Non-Energy Products from Fuels and Solvent Use.

In Tamil Nadu, the IPPU sector accounted for about ~5% of the total economy-wide emissions in 2018. The overall IPPU emissions increased at a CAGR of 3.98% from 6.10 Mt CO₂e in 2005 to 10.14 Mt CO₂e in 2018. Emissions from the IPPU sector of the state were primarily driven by the Mineral Industry sub-sector. Mineral Industry emissions grew at a CAGR of 3.75% from 5.95 Mt CO₂e in 2005 to 9.60 Mt CO₂e in 2018. A slight decrease observed in IPPU emissions in 2016 was due to decrease in emissions from Cement Production in the Mineral Industry sub-sector (see Figure 7).

Figure 7: GHG Emissions Estimate of IPPU Sector – Tamil Nadu (2005 to 2018)

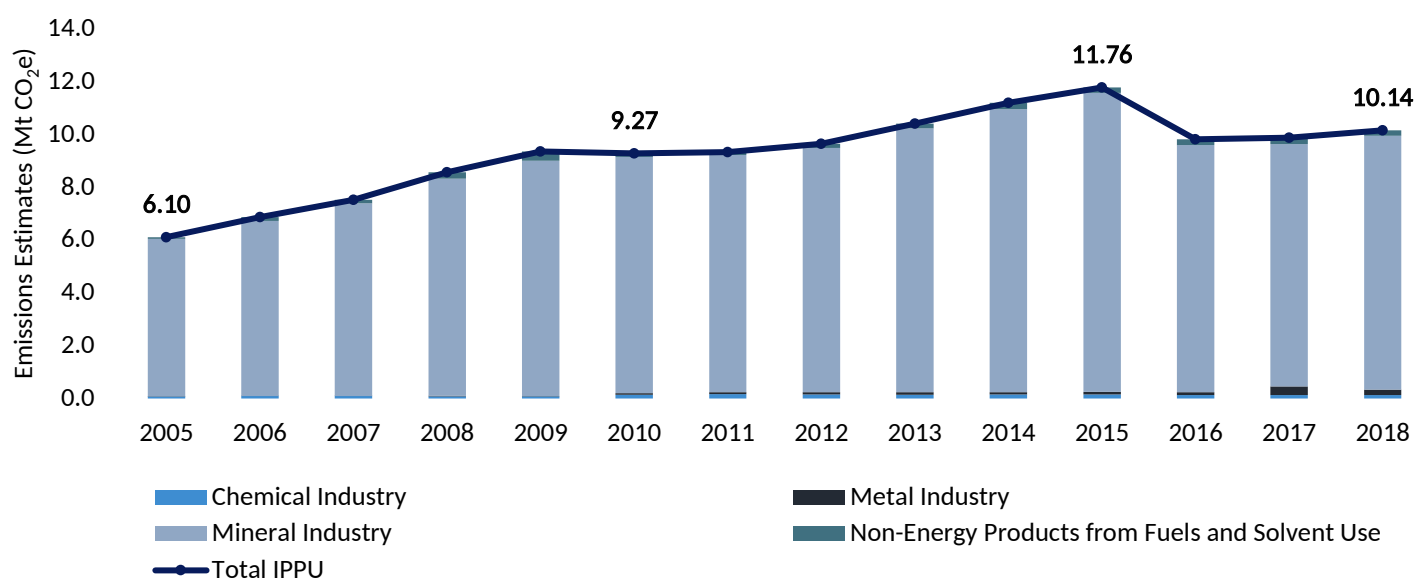


Figure 8 shows a trend of GHG emissions by various IPPU categories across the reference period. In 2018, Cement Production, a major source of IPPU emissions, contributed ~92% of the sector's total emissions, followed by Lime Production (~3%), Iron and Steel (~2%), and Lubricant Use (~1.5%) (see Figure 9).

Figure 8: Percentage Share of GHG Emissions from IPPU Categories (2005 to 2018)

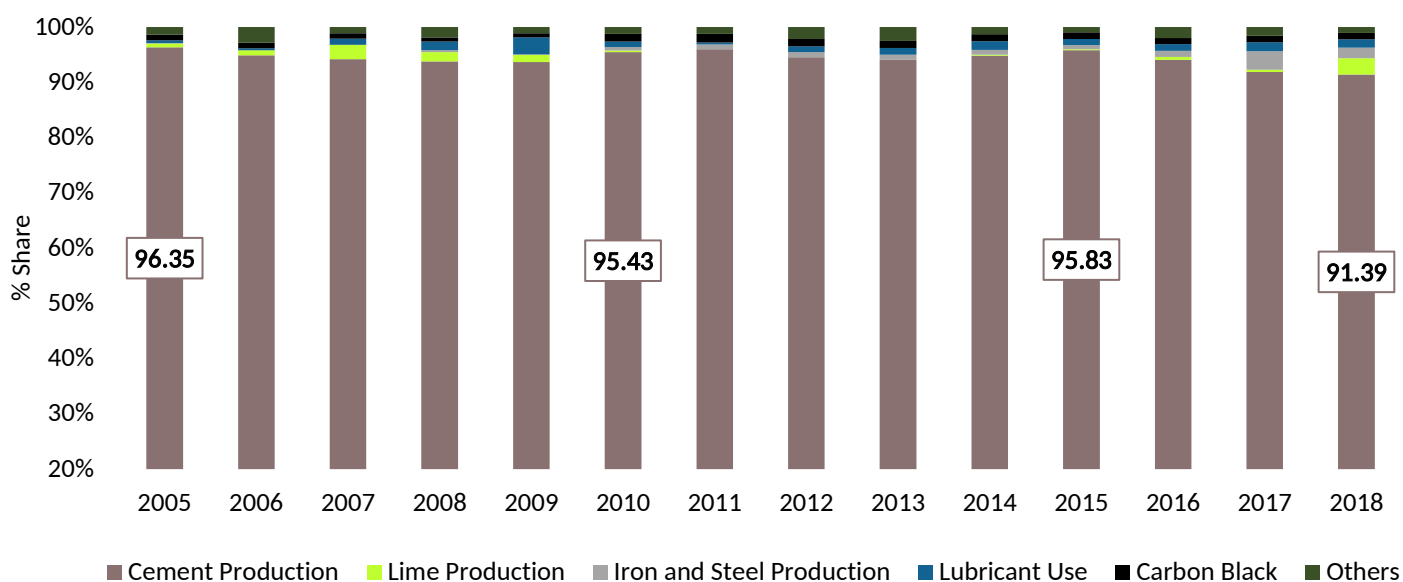
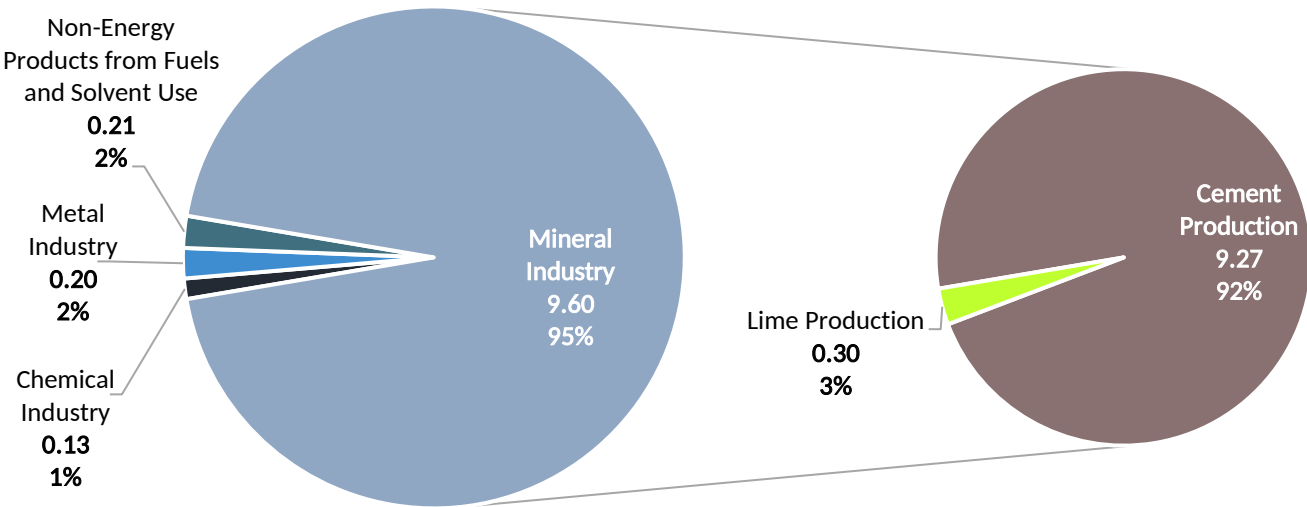


Figure 9: Sub-Sector Emissions (Mt CO₂e) and Percentage Share in Total IPPU Emissions (2018)



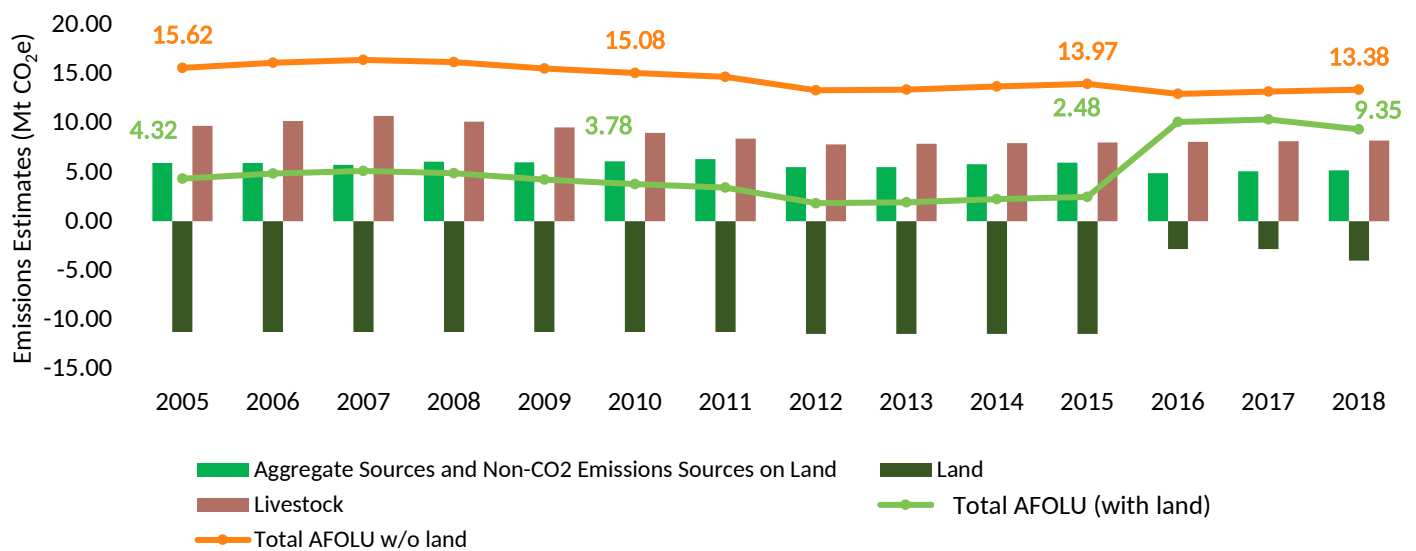


AFOLU Sector

Emissions from the Agriculture, Forestry and Other Land Use (AFOLU) sector arise from three main sub-sectors: Livestock, Land and Aggregate Sources and Non-CO₂ Emissions Sources on Land*. In Tamil Nadu, gross emissions of AFOLU sector (excluding Land sub-sector) declined slowly at a CAGR of 1.18%, from 15.62 Mt CO₂e in 2005 to 13.38 Mt CO₂e in 2018. This can be attributed to reduction in emissions from the Livestock sub-sector. However, the net AFOLU emissions of Tamil Nadu increased at a CAGR 6.11% between 2005 to 2018. This was due to reduced sinks in 2016 and 2017, which despite a slight increase in 2018, remained below the 2005 to 2015 levels (see Figure 10). The reduced sinks from the Land sub-sector from 2016 onwards, can be attributed to relatively smaller increase in forest area and other Land Use and Land-Use Change trends and practices.

The average annual removals from the Land sub-sector in Tamil Nadu during the reference period were 9.63 Mt CO₂e, around ~66% of the average annual gross AFOLU emissions.

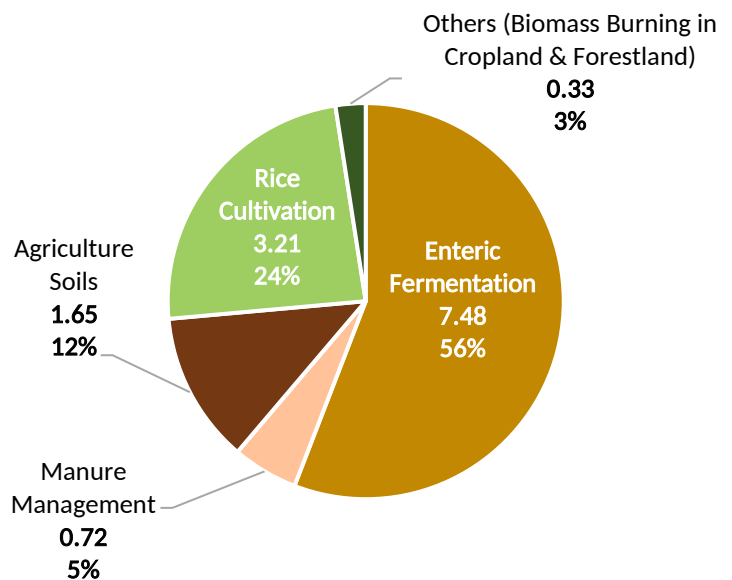
Figure 10: GHG Emissions Estimates of AFOLU Sector - Tamil Nadu (2005 to 2018)



The Livestock sub-sector had the maximum share of ~61% of gross AFOLU emissions (excluding Land sub-sector) of Tamil Nadu during the reference period. Within the Livestock sub-sector, Enteric Fermentation was the major contributor to gross AFOLU emissions, with an average share of ~55% across the reference period. However, emissions from this category declined at a rate of 1.28% (compounded annually) from 8.84 Mt CO₂e in 2005 to 7.48 Mt CO₂e in 2018.

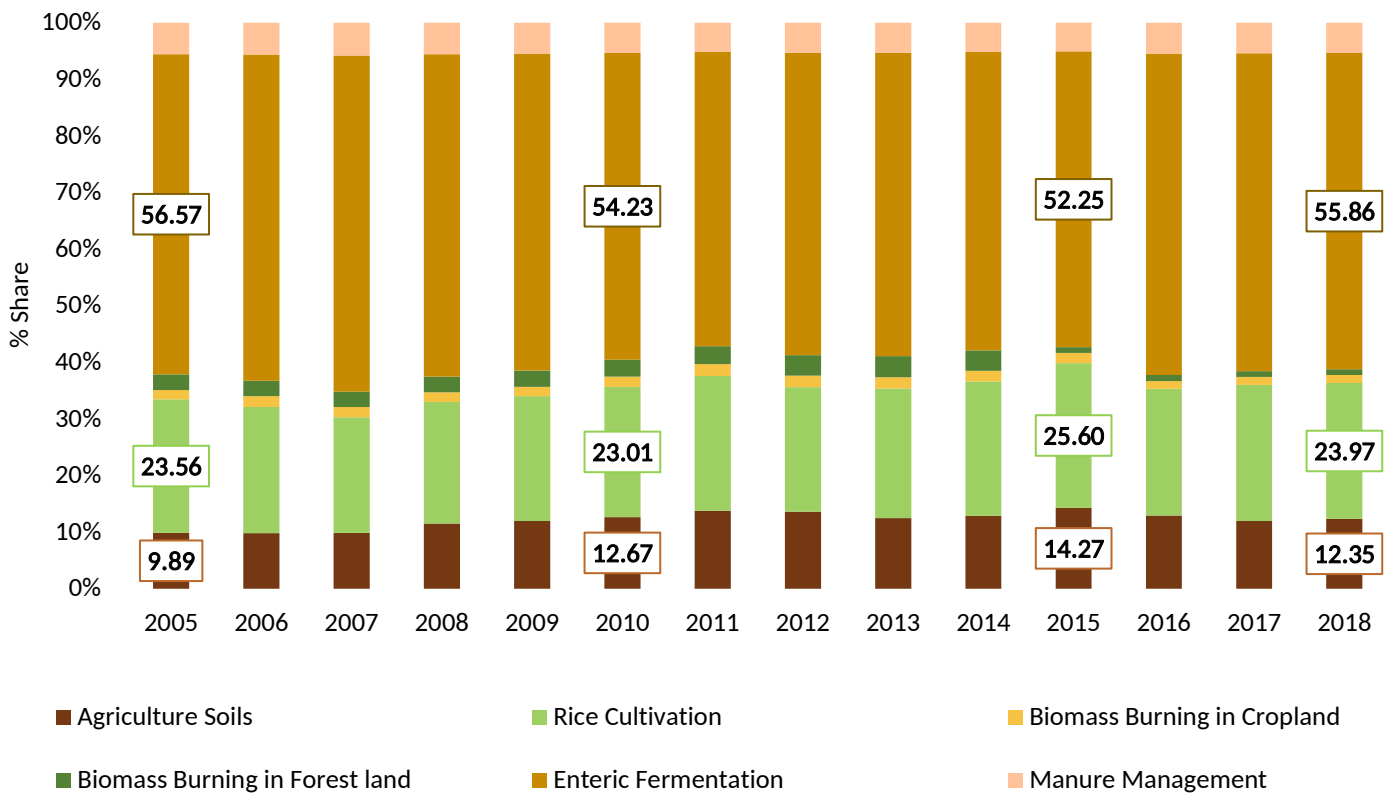
From the Aggregate Sources sub-sector, the categories of Rice Cultivation and Agriculture Soils were the top contributors to gross AFOLU emissions, with average shares of about ~23% and ~12%, respectively, during the reference period. While the share of emissions from Agriculture Soils increased from ~10% in 2005 to ~12% in 2018, the share of emissions from Rice Cultivation increased marginally during the reference period (see Figures 11 and 12).

Figure 11: Category-wise Emissions (Mt CO₂e) and Percentage Share in Gross AFOLU Emissions (excluding Land sub-sector) (2018)



* The sub-sector called 'Aggregate Sources and Non-CO₂ Emissions Sources on Land' includes emissions from Rice Cultivation, Agriculture Soils, and Biomass Burning in Cropland and Forestland.

Figure 12: Category-wise Percentage Share in Gross AFOLU Emissions (excluding Land sub-sector) (2005 to 2018)





Waste Sector

Solid Waste Disposal, Domestic Wastewater and Industrial Wastewater are the key sources of GHG emissions in the Waste sector. The Waste sector contributed to almost 4% of total economy-wide emissions of Tamil Nadu in 2018. GHG emissions from the Waste sector grew at a CAGR of 1.59% from 7.57 Mt CO₂e in 2005 to 9.30 Mt CO₂e in 2018. There was a decrease in emissions in 2015 which can be attributed to decline in emissions from the Industrial Wastewater sub-sector (see Figure 13).

Figure 13: GHG Emissions Estimate of Waste Sector – Tamil Nadu (2005 to 2018)

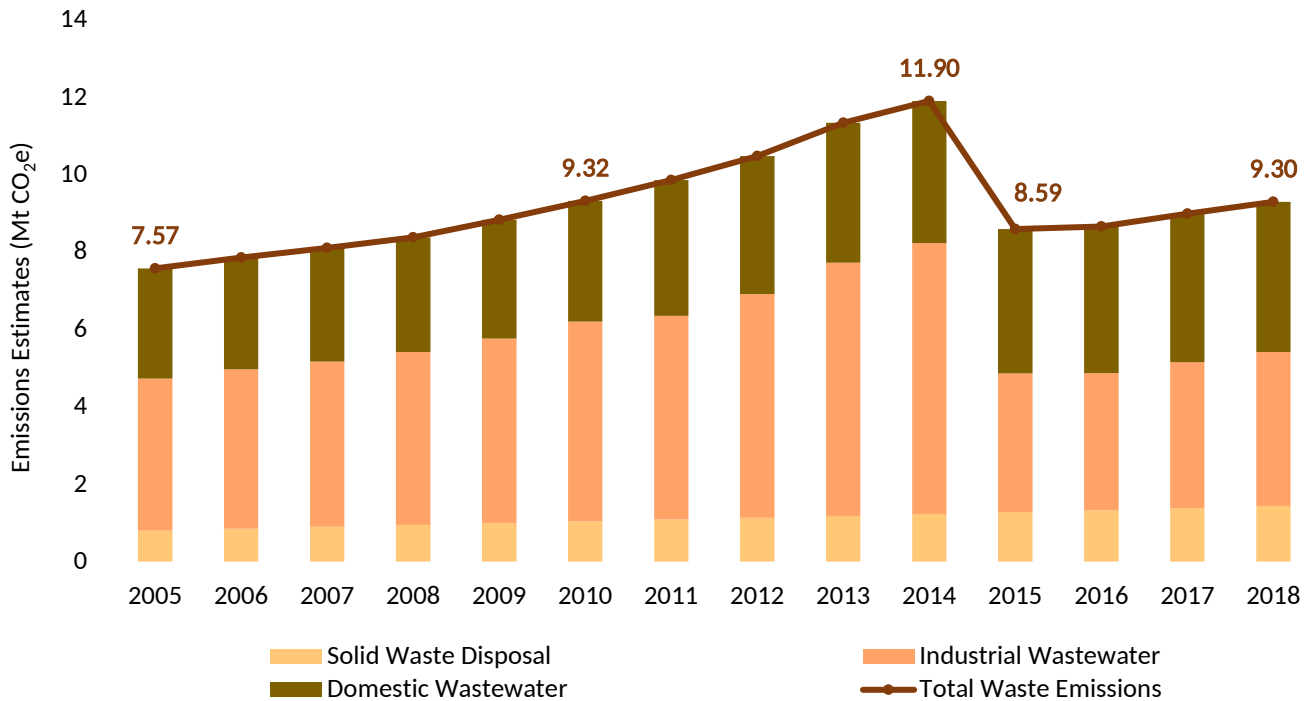
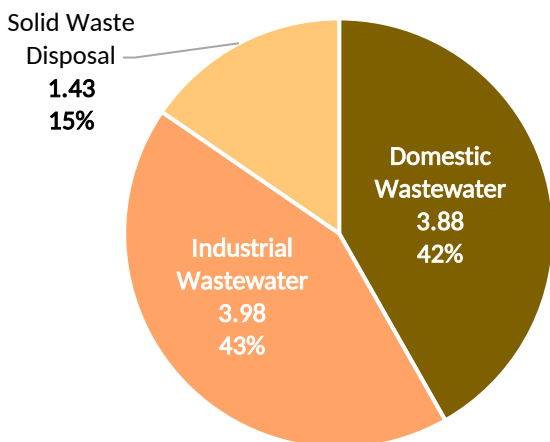


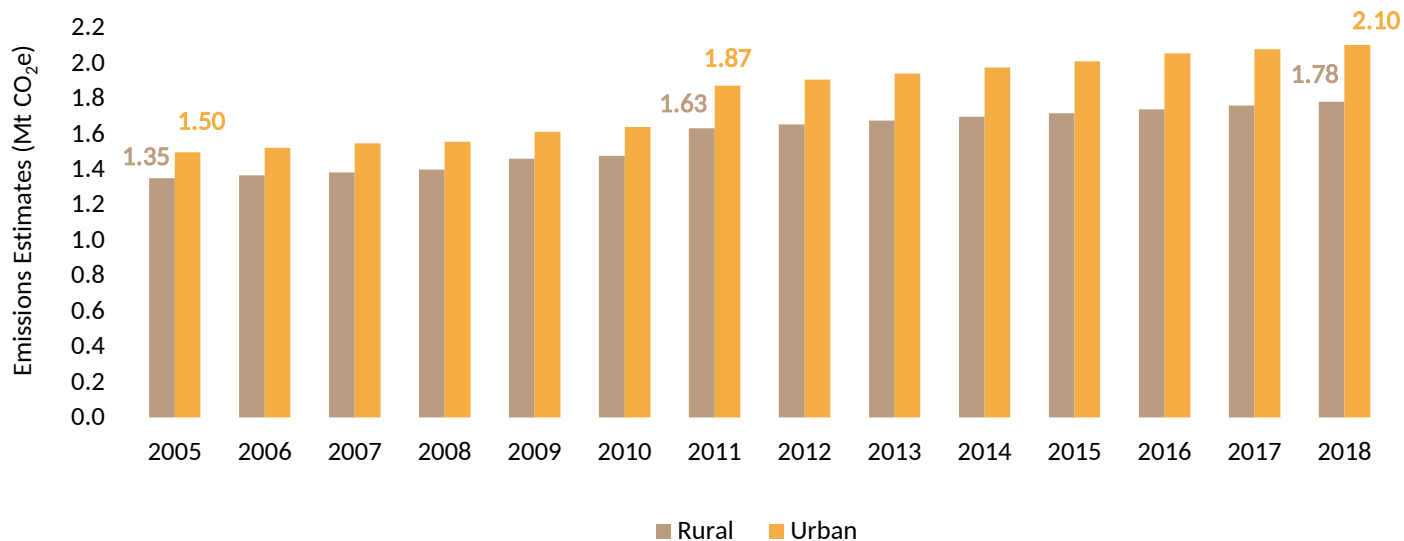
Figure 14: Sub-sector Emissions (Mt CO₂e) and Percentage Share in Total Waste Sector Emissions (2018)



Discharge of untreated wastewater and use of septic tanks are the key drivers of emissions due to Domestic Wastewater sub-sector. Domestic Wastewater had a share of 42% in the total Waste sector emissions of Tamil Nadu in 2018. Approximately 15% of the Waste sector emissions were from Solid Waste Disposal, which grew at an estimated CAGR of 4.61% from 0.80 Mt CO₂e in 2005 to 1.43 Mt CO₂e in 2018. Industrial Wastewater accounted for nearly 43% of Waste sector emissions in 2018 and grew at a CAGR of 0.09% from 3.93 Mt CO₂e in 2005 to 3.98 Mt CO₂e in 2018 (see Figure 14).

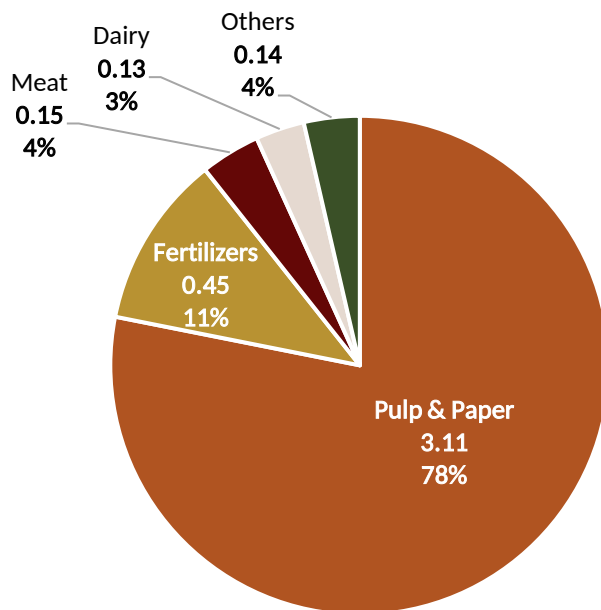
Emissions from Domestic Wastewater of both rural and urban areas grew at a CAGR of 2.42% from 2.85 Mt CO₂e in 2005 to 3.88 Mt CO₂e in 2018. Almost 53% of Domestic Wastewater emissions were from the urban areas of Tamil Nadu in 2018 as shown in Figure 15.

Figure 15: Area-wise GHG Emissions Estimates of Domestic Wastewater (2005 to 2018)



The Pulp and Paper Industry was the major contributor to Industrial Wastewater emissions with a share of ~78% in 2018. This was followed by Fertilizers Industries (~11%) and Meat (~4%) as illustrated in Figure 16.

Figure 16: Category-wise Emissions (Mt CO₂e) and Percentage Share in Industrial Wastewater Emissions (2018)





The GHG Platform India is a civil society initiative providing an independent estimation and analysis of India's Greenhouse Gas (GHG) emissions across key sectors, namely- Energy, IPPU, AFOLU and Waste.

The Platform comprises of the following civil society:



The **Council on Energy, Environment and Water (CEEW)** is one of South Asia's leading not-for-profit policy research institutions. It uses data, integrated analysis and strategic outreach to explain – and change – the use, reuse, and misuse of resources.

The **International Maize and Wheat Improvement Center (CIMMYT)** is the global leader in agricultural research for development in wheat and maize-based farming systems.

Center for Study of Science, Technology and Policy (CSTEP) is a not for profit research organisation incorporated in 2005 u/s 25 of The Companies Act, 1956.

ICLEI - Local Governments for Sustainability is a leading global network of over 1,500 cities, towns and regions committed to building a sustainable future.

Vasudha Foundation, set up in 2010, is a not for profit organisation, working in the clean energy and climate policy space.

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