

# Trend Analysis of GHG Emissions of TELANGANA

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

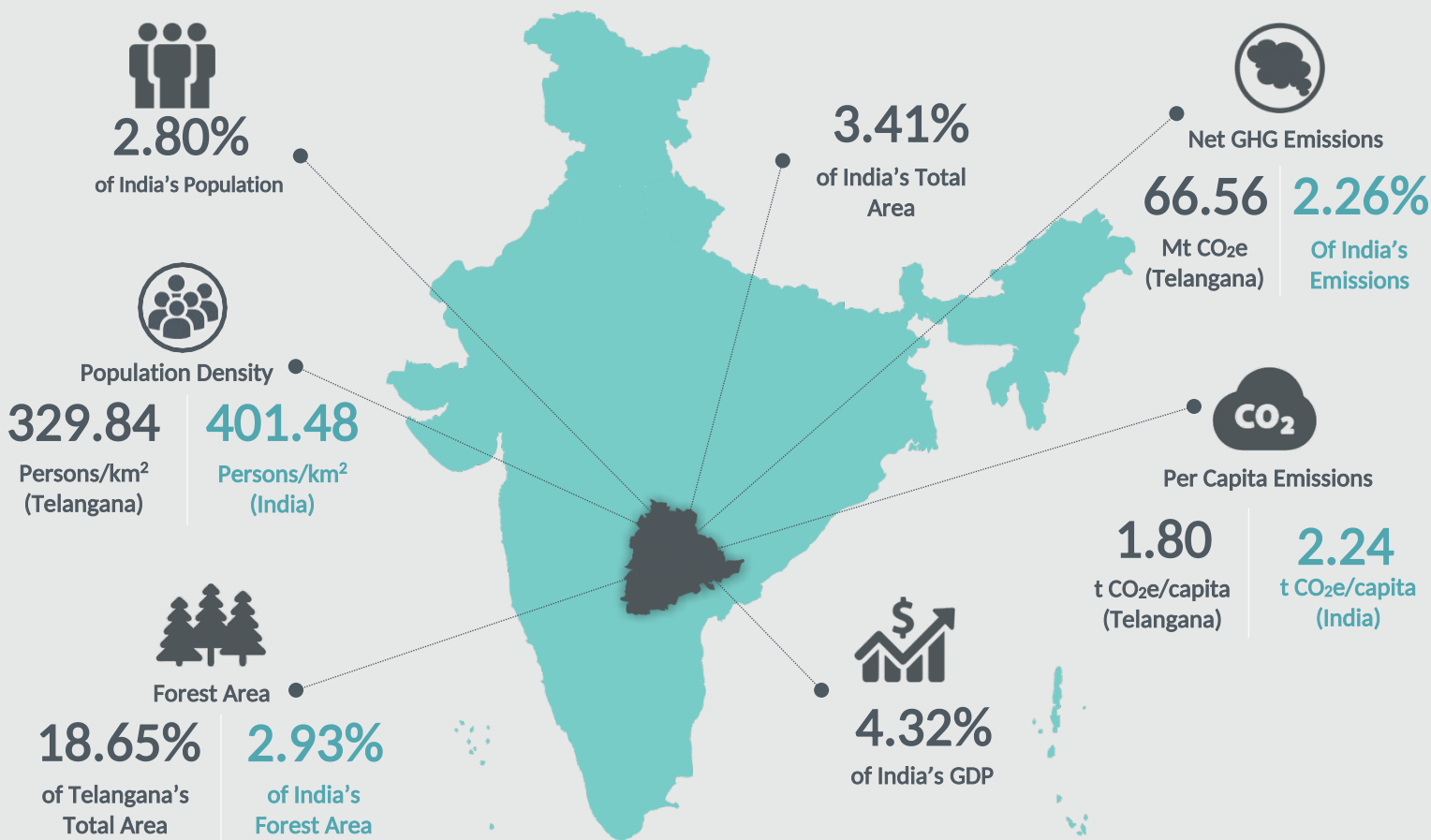
The Platform seeks to add value to the various ongoing GHG emissions estimation efforts, by helping address the existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

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



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

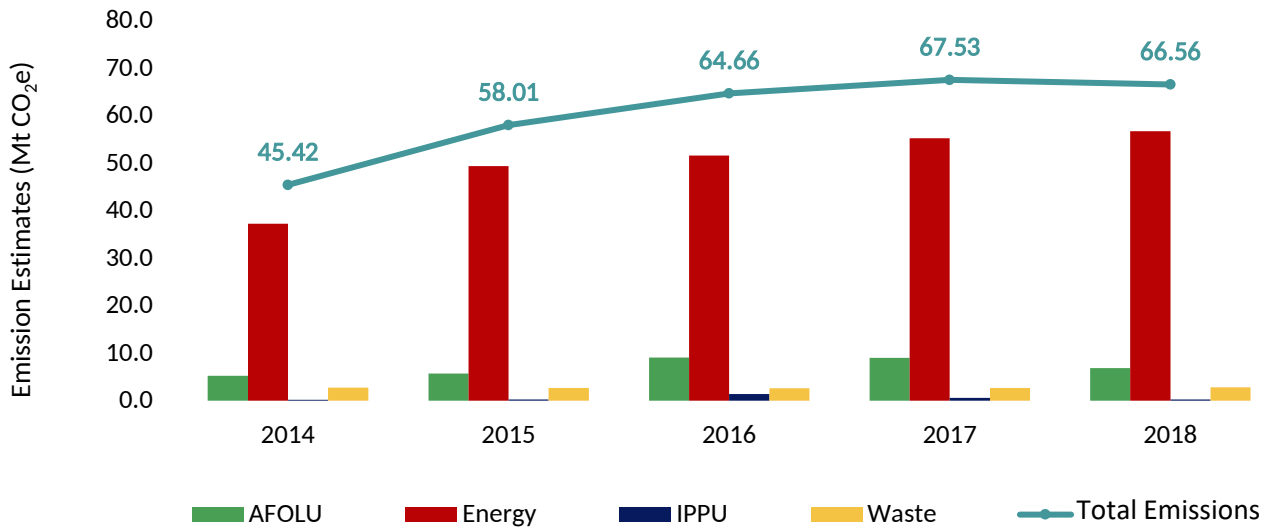
## Telangana at a Glance (2018)



\*The map represents the data for 2018

# Economy-wide Emissions Estimates

Figure 1: GHG Emissions Estimates of Telangana (2014 to 2018)



Emissions of Telangana increased at a rate of 10.02% (compounded annually) from 45.43 Mt CO<sub>2</sub>e in 2014 to 66.56 Mt CO<sub>2</sub>e in 2018. Telangana’s rapid growth of emissions during the reference period was due to increase in emissions from the Energy sector (see Figure 1). In 2014, the share of Energy sector in the total economy-wide emissions of Telangana was ~82%, while Agriculture, Forestry and Other Land Use (AFOLU) and Waste sectors accounted for ~12% and ~6%, respectively. Negligible emissions were registered from the Industrial Processes and Product Use (IPPU) sector in 2014. In 2018, the share of emissions from Energy sector had increased to ~85% while that of the AFOLU and Waste sectors declined to ~10% and 4%, respectively, while IPPU sector accounted for 1% of the total economy-wide emissions (see Figure 2).

Figure 2: Sector-wise Contribution (Mt CO<sub>2</sub>e) and Percentage Share in total Economy-wide GHG Emissions of Telangana

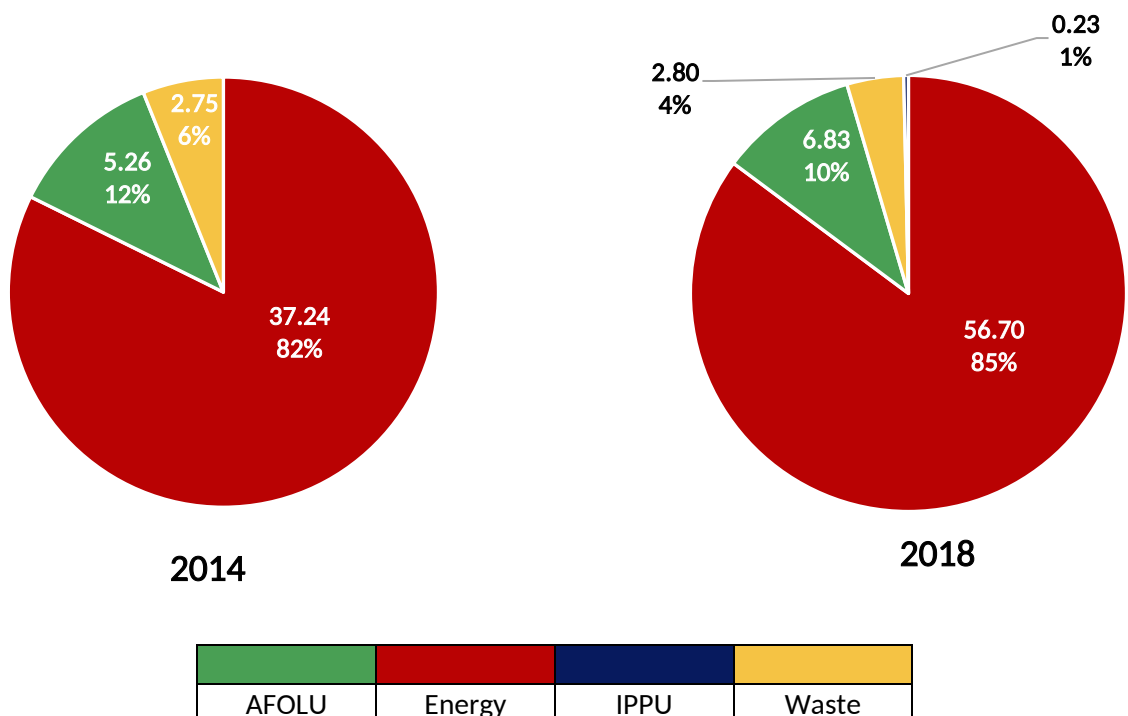
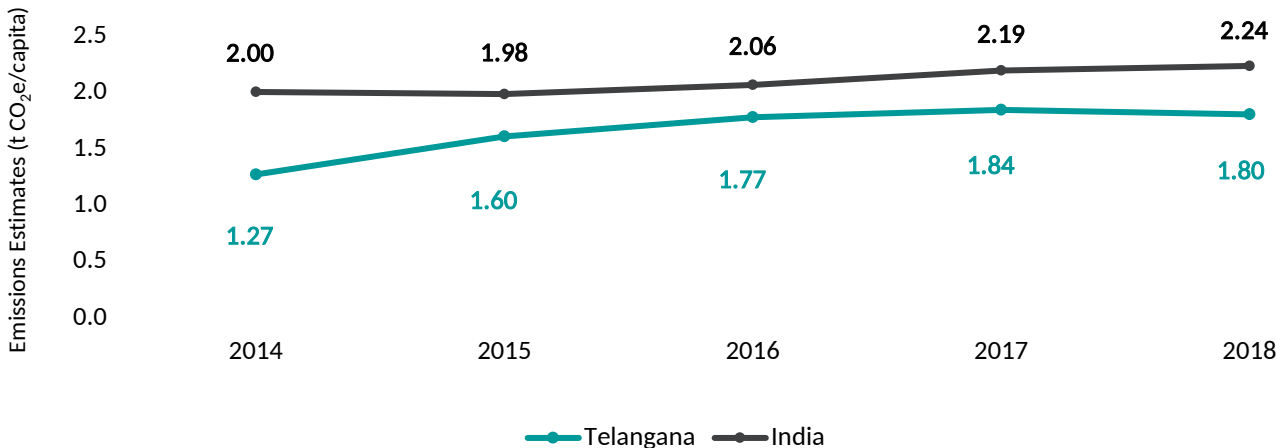


Figure 3: Per Capita GHG Emissions of Telangana and India (2014 to 2018)



The per capita emissions of Telangana were slightly lower than the per capita emissions of India. However, they increased at a CAGR of 9.20% from 1.27 t CO<sub>2</sub>e/capita in 2014 to 1.80 t CO<sub>2</sub>e/capita in 2018, which was higher than that of India (~2.76%) during this period.

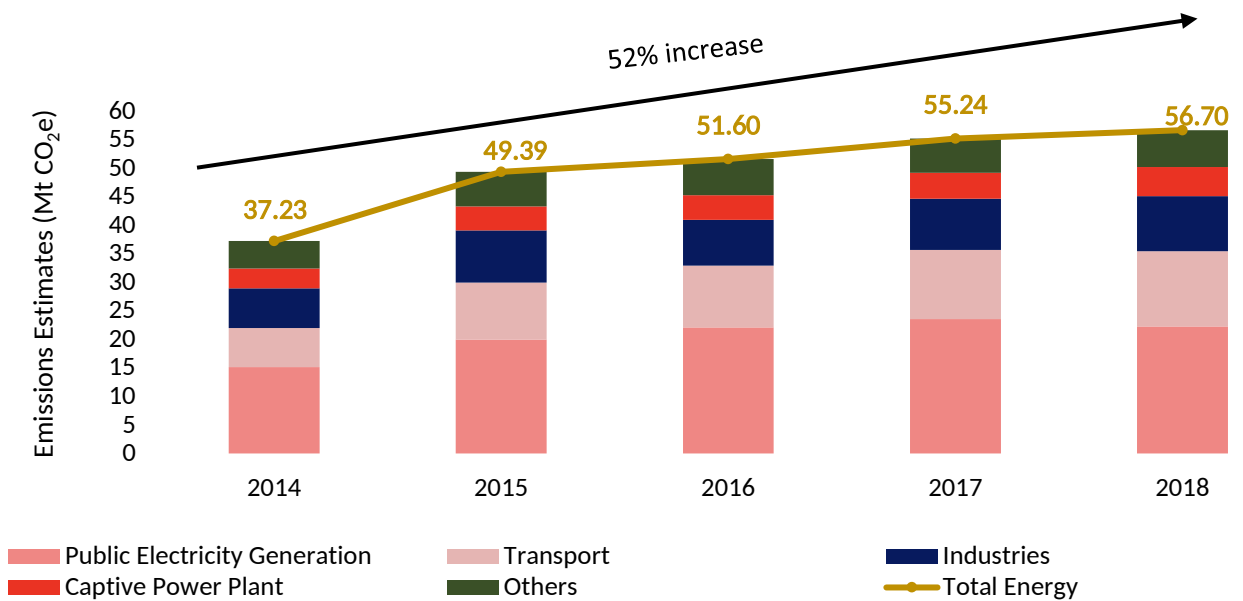


# Energy Sector

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 Telangana accounted for ~85% of the total economy-wide emissions in 2018. Emissions from the Energy sector increased at a CAGR of 11.08% from 37.23 Mt CO<sub>2</sub>e in 2014 to 56.70 Mt CO<sub>2</sub>e in 2018 as shown in Figure 4 below.

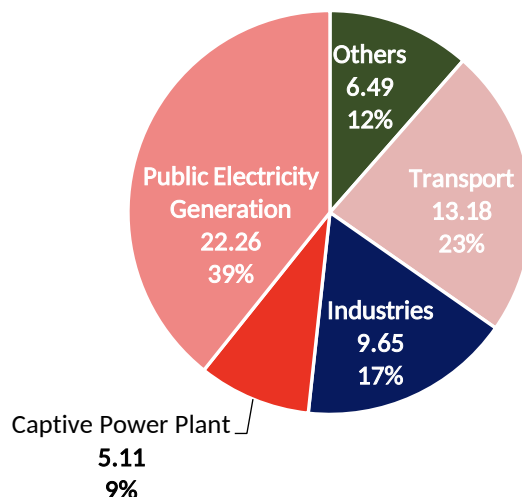
Figure 4: GHG Emissions Estimates of Energy Sector - Telangana (2014 to 2018)



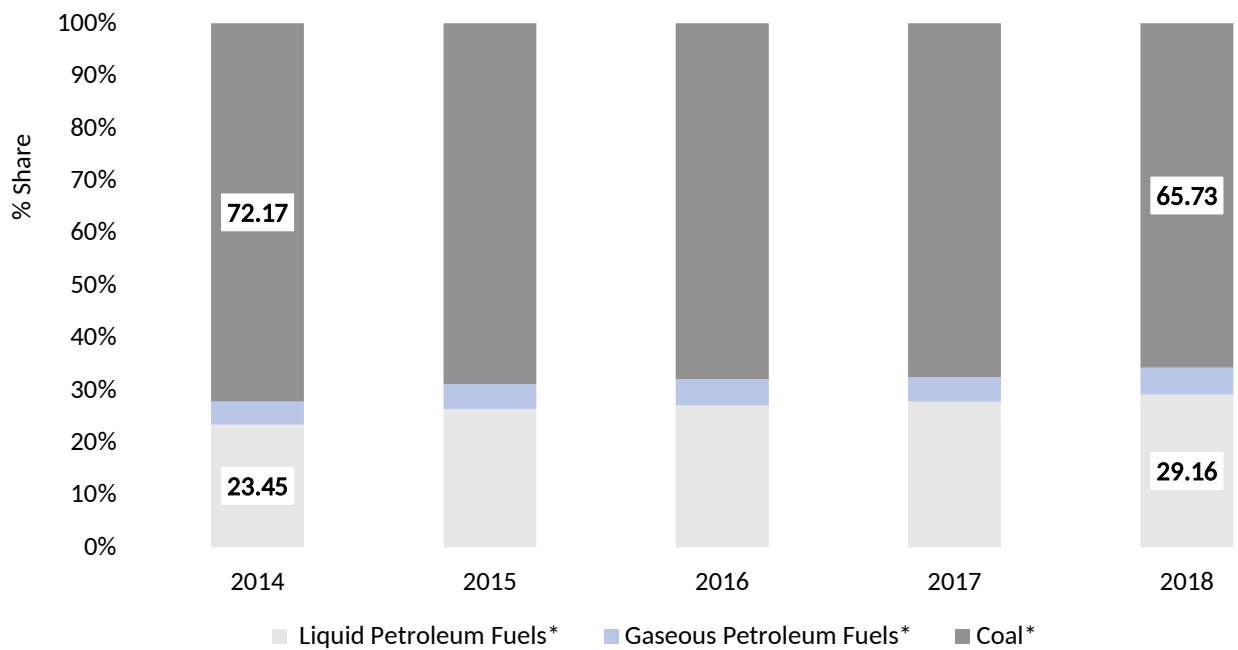
Within the Energy sector, Public Electricity Generation (PEG) category was the major contributor to total Energy sector emissions with a share of ~39% in 2018. This was followed by Transport and Industrial Energy categories with shares of 23% and 17%, respectively (see Figure 5).

Within the Fuel Combustion sub-sector, emissions from Coal were the major contributor, with an average share of ~68% across the reference period. Emissions from combustion of Liquid Petroleum Fuels and Gaseous Petroleum Fuels, had average shares of ~27% and 5%, respectively, between 2014 and 2018 (see Figure 6).

Figure 5: Category-wise Emissions (Mt CO<sub>2</sub>e) 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 (2014 to 2018)**



*\*Notes:*

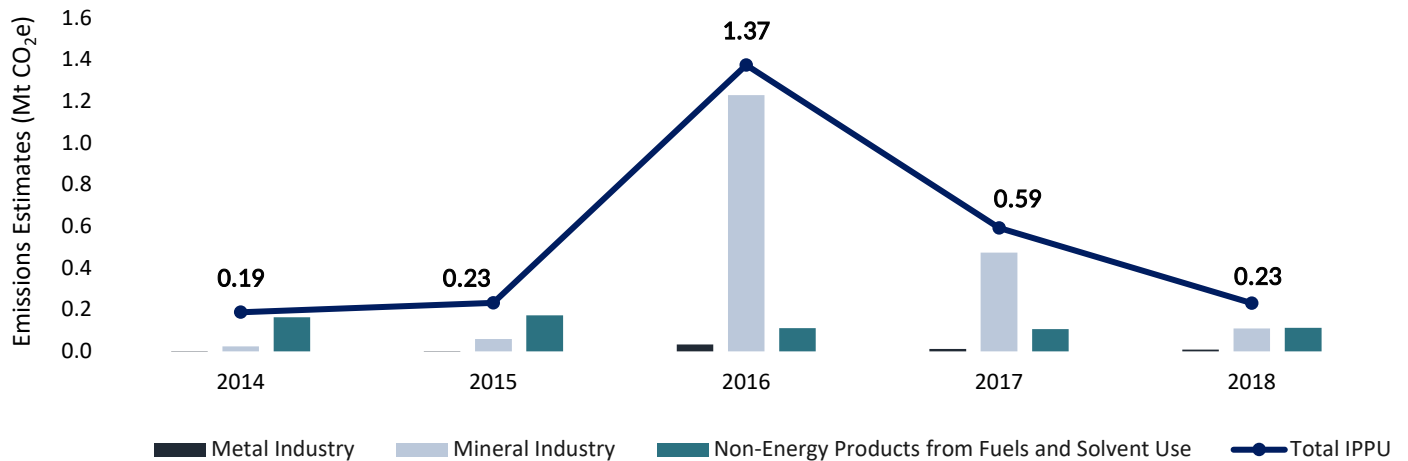
1. Coke is included in Coal because the bifurcation of pet-coke and coke was not available
2. Gaseous Petroleum Fuels - natural gas, LPG and other gaseous fuels
3. Liquid Petroleum Fuels - ATF, diesel, kerosene, motor spirit and other liquid fuels



# 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 Telangana, the IPPU sector represented ~1% of the total economy-wide GHG emissions in 2018. Between 2014 and 2016, IPPU emissions increased from 0.19 Mt CO<sub>2</sub>e to 1.37 Mt CO<sub>2</sub>e at a CAGR of 171%. However, after 2016 there was a decline in emissions. In 2018, IPPU sector emissions were around 0.23 Mt CO<sub>2</sub>e. The 2016 spike in emissions of this sector was due to increased emissions from the Glass Production category under the Mineral Industry sub-sector (see Figure 7) which declined sharply post 2016.

Figure 7: GHG Emissions Estimates of IPPU Sector - Telangana (2014-2018)



The share of emissions from Mineral Industry and Non-Energy Products from Fuels and Solvent Use sub-sectors in 2018 was 47% and 49%, respectively. The key categories contributing to total IPPU emissions are Glass Production (~47%) from Mineral Industry sub-sector and Lubricant Use (37%) from Non-Energy Products from Fuels and Solvent Use sub-sector. Emissions from Metal Industry were entirely due to Iron and Steel Production, constituting 4% of the overall sector's emissions (see Figures 8 and 9).

Figure 8: Sub-sector Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total IPPU Emissions (2018)

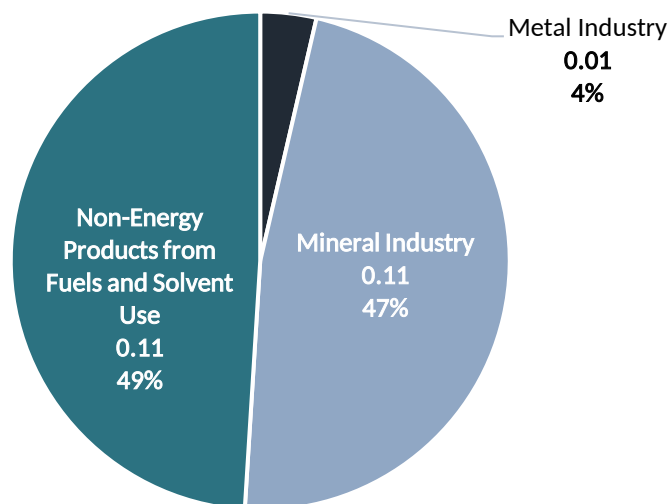
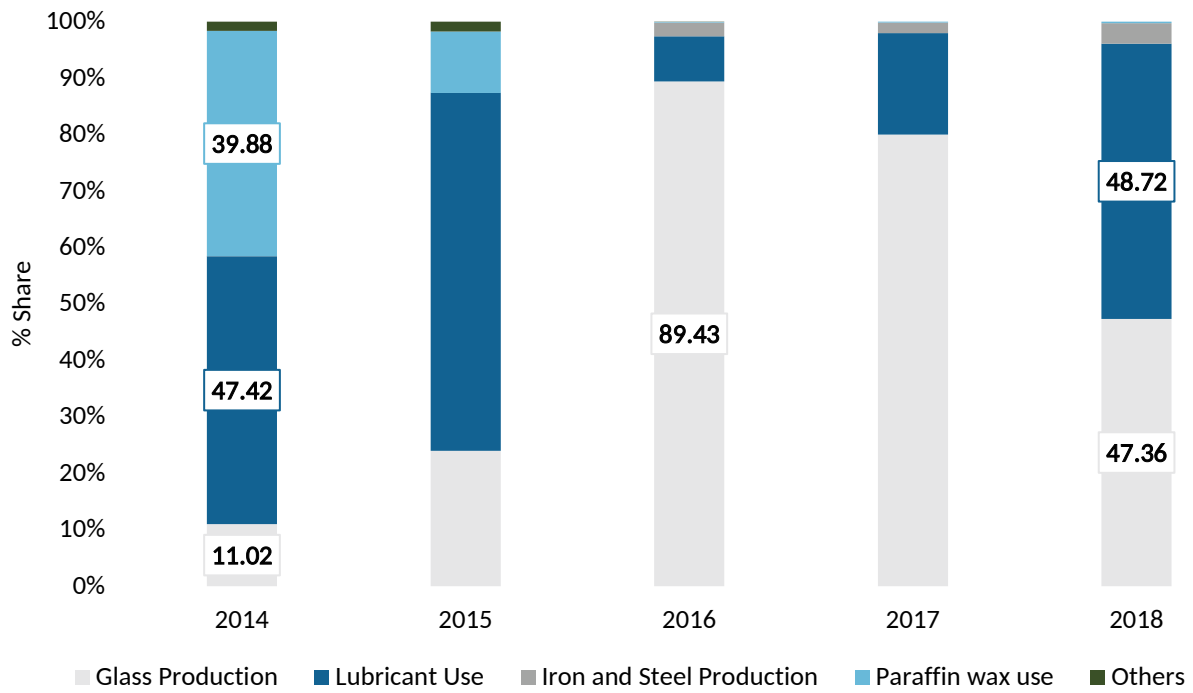


Figure 9: Percentage Share of GHG Emissions from IPPU Categories (2014 to 2018)

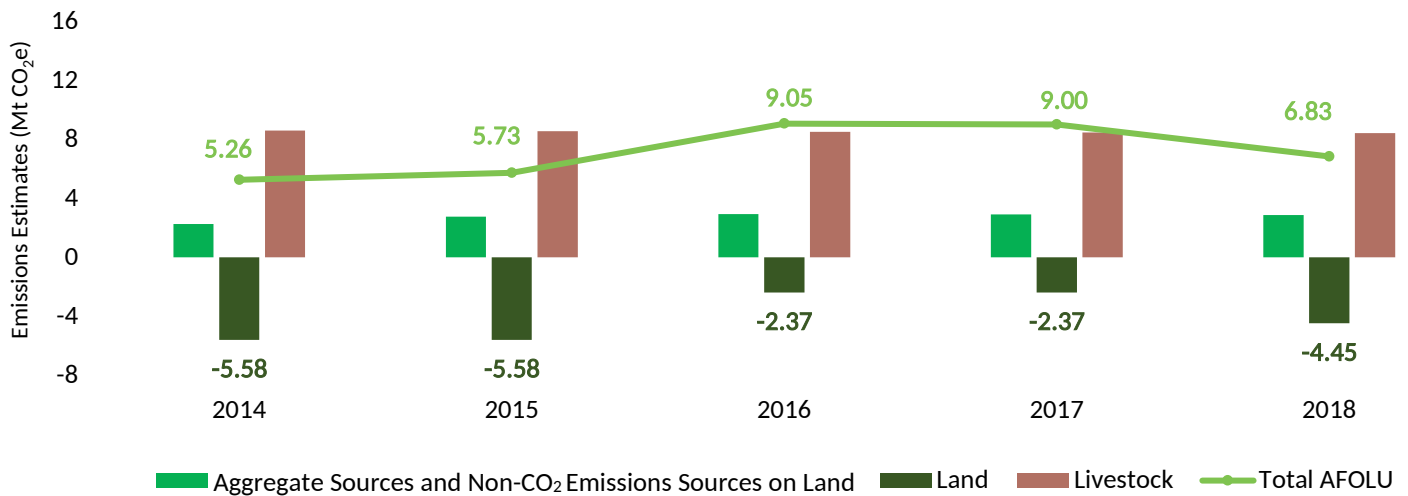




# AFOLU Sector

Emissions from the Agriculture, Forestry and Other Land Use (AFOLU) sector arise from three main sub-sectors, namely Livestock, Land and Aggregate Sources and Non-CO<sub>2</sub> Emissions Sources on Land\*. In Telangana, the net emissions of AFOLU sector increased at a CAGR of ~6.8% between 2014 and 2018. Livestock sub-sector remained the leading contributor to AFOLU emissions throughout the reference period (see Figure 10). Removals from the Land Sub-sector decreased in 2016 and 2017, due to decrease in sink of Forest Land. However, removals from this sub-sector registered growth in 2018, inching closer to 2014 levels. This increase in sink in the Land sub-sector (from -2.37 Mt CO<sub>2</sub>e sink in 2017 to -4.45 Mt CO<sub>2</sub>e sink in 2018) can be attributed to increase in forest area as well as enhanced carbon stock density of forests of Telangana as reported by Forest Survey of India (2021)\*\*. The average annual removals from the Land sub-sector in Telangana during the reference period were 4.07 Mt CO<sub>2</sub>e, around ~36.38% of the average annual gross AFOLU emissions.

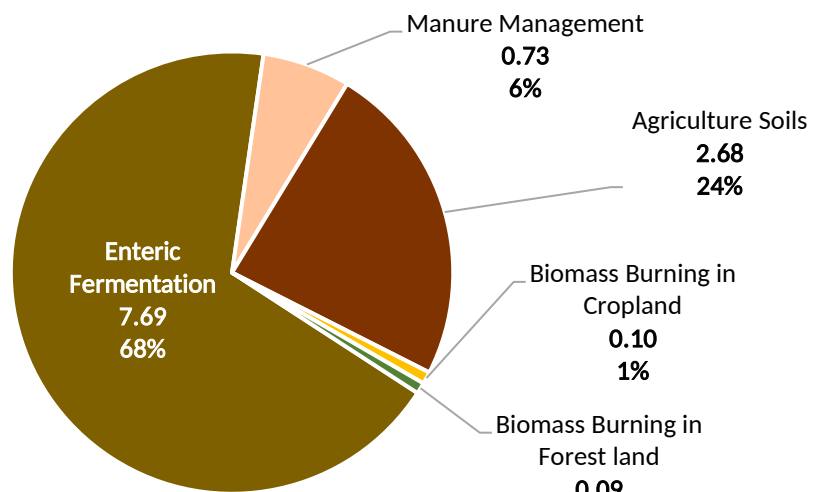
**Figure 10: GHG Emissions Estimates of AFOLU Sector - Telangana (2014 to 2018)**



The Livestock sub-sector had the maximum share of ~76% of gross AFOLU GHG emissions (excluding Land sub-sector) in Telangana during the reference period. Within the Livestock sub-sector, Enteric Fermentation was the major contributor to gross AFOLU emissions, across the reference period, with an average share of ~69%. However, the emissions from this category declined at a rate of 0.5% (compounded annually) from 8.58 Mt CO<sub>2</sub>e in 2014 to 8.41 Mt CO<sub>2</sub>e in 2018.

From the Aggregate Sources sub-sector, the category of Agriculture Soils was the top GHG contributor to gross AFOLU emissions, with an average share of ~22%. Emissions from this category increased at a CAGR of 9.5% between 2014 and 2018 (see Figures 11 and 12).

**Figure 11: Category-wise Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Gross AFOLU Emissions (excluding Land sub-sector) (2018)**

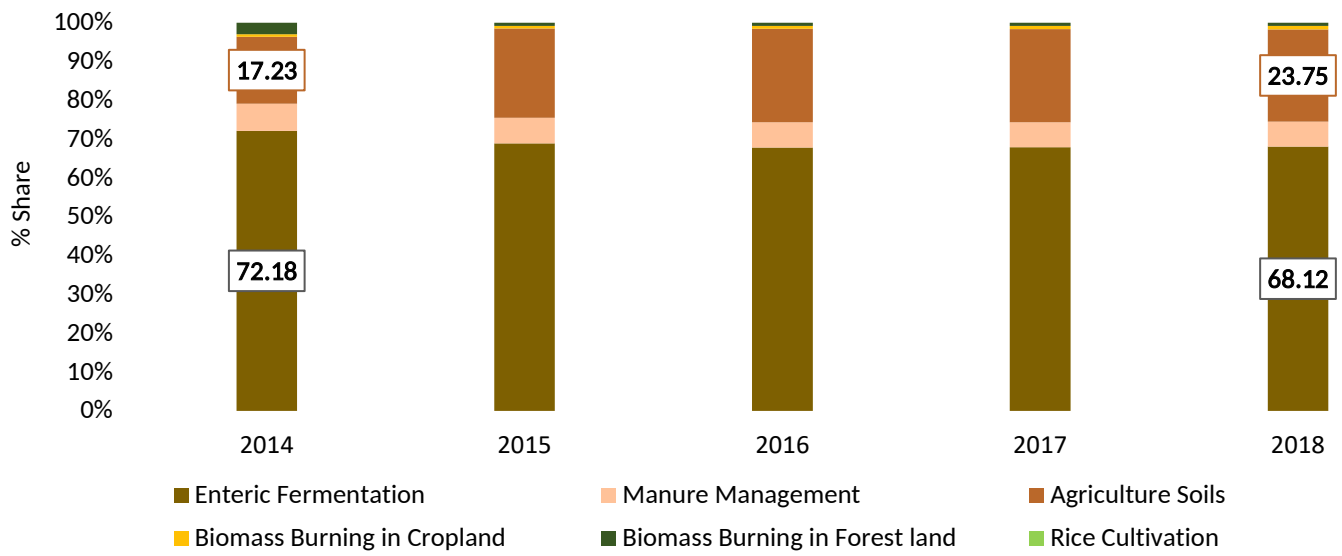


\* The sub-sector called 'Aggregate Sources and Non-CO<sub>2</sub> Emissions Sources on Land' includes emissions from Rice Cultivation, Agriculture Soils, and Biomass Burning in Cropland and Forestland.

\*\* Forest Survey of India 2021 reports forest area for 2019



Figure 12: Category-wise Share of Gross AFOLU GHG Emissions (excluding Land sub-sector) (2014 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 4.2% of total economy-wide emissions of Telangana in 2018. GHG emissions from the Waste sector of Telangana grew at a CAGR of 1.31% from 2.75 Mt CO<sub>2</sub>e in 2014 to 2.80 Mt CO<sub>2</sub>e in 2018 (see Figure 13).

Figure 13: GHG Emissions Estimates of Waste Sector - Telangana (2014 to 2018)

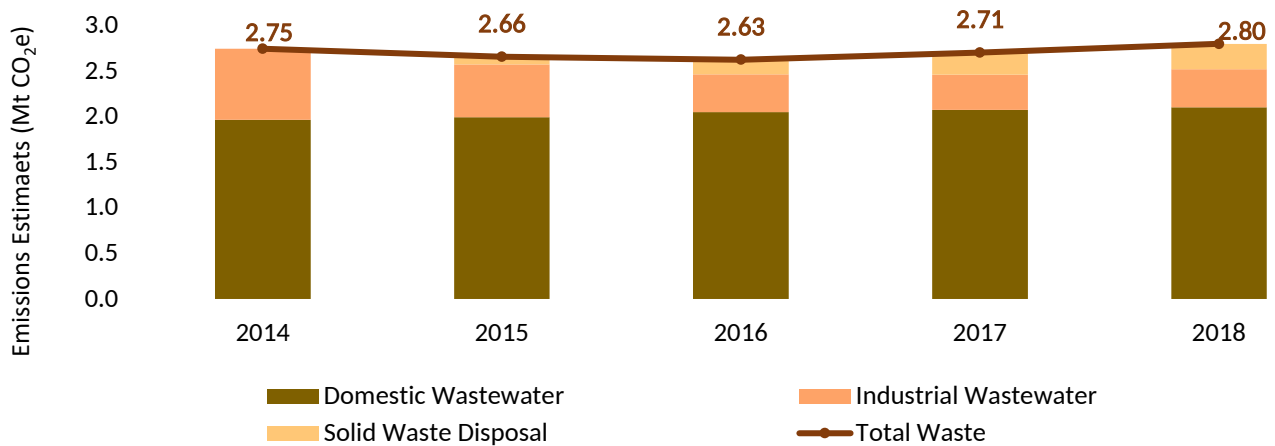
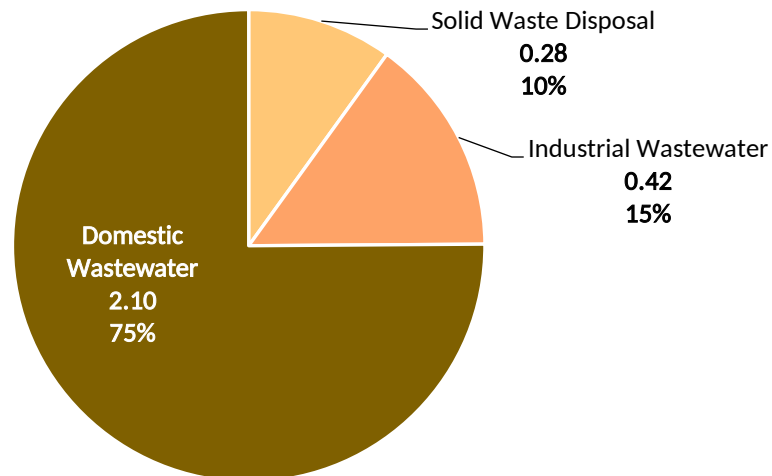


Figure 14: Sub-sector Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total Waste Sector emissions (2018)



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 75% in the total Waste sector emissions of Telangana in 2018. Approximately 10% of the Waste sector emissions were from Solid Waste Disposal, which grew at an estimated CAGR of 34.4% from 0.09 Mt CO<sub>2</sub>e in 2014 to 0.28 Mt CO<sub>2</sub>e in 2018. Industrial Wastewater accounted for nearly 15% of Waste sector emissions in 2018 and declined at a CAGR of 7.8% (0.78 Mt CO<sub>2</sub>e in 2014 to 0.42 Mt CO<sub>2</sub>e in 2018) (see Figure 14).

Emissions from Domestic Wastewater of both rural and urban areas grew at a CAGR of ~1.4% from 1.97 Mt CO<sub>2</sub>e in 2014 to 2.10 Mt CO<sub>2</sub>e in 2018. Almost 56% of Domestic Wastewater emissions were from the urban areas of Telangana in 2018 as shown in Figure 15.

Figure 15: Area-wise GHG Emissions Estimates of Domestic Wastewater (2014 to 2018)

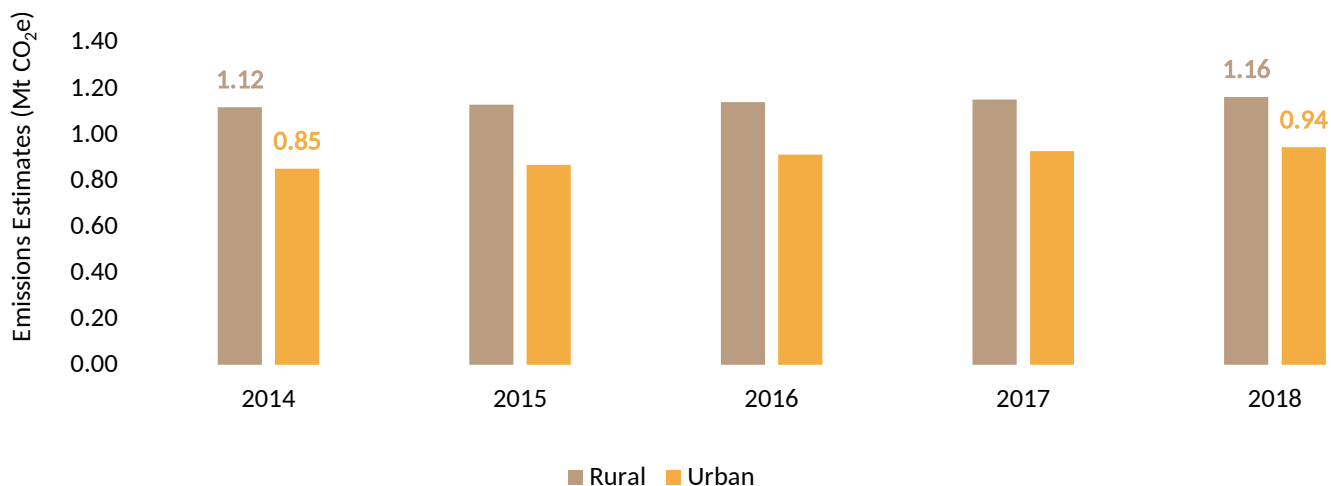
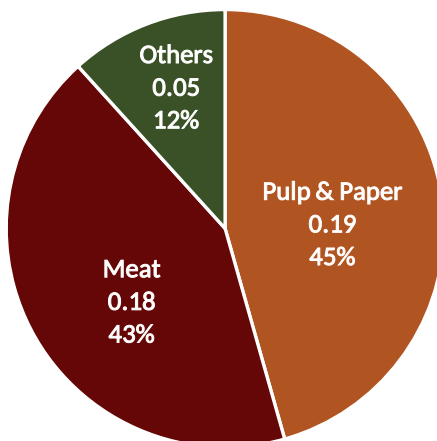


Figure 16 shows that the Pulp and Paper Industry was the major contributor to these emissions with a share of ~45% followed by Meat Industry (43%) in 2018 as illustrated below.

Figure 16: Category-wise Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total 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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