

Trend Analysis of GHG Emissions of MANIPUR

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

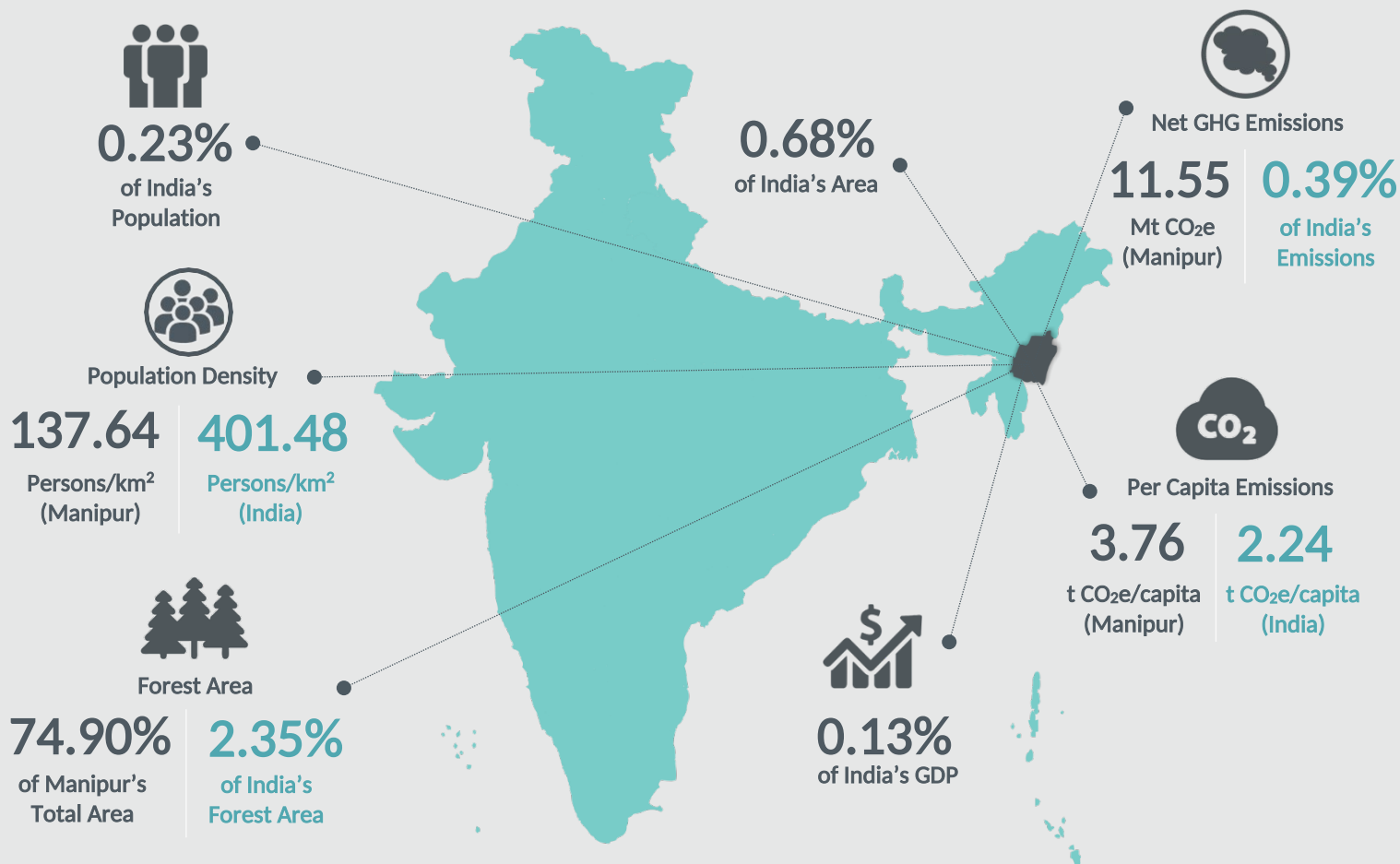
The Platform seeks to add value to the various ongoing GHG emissions estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

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



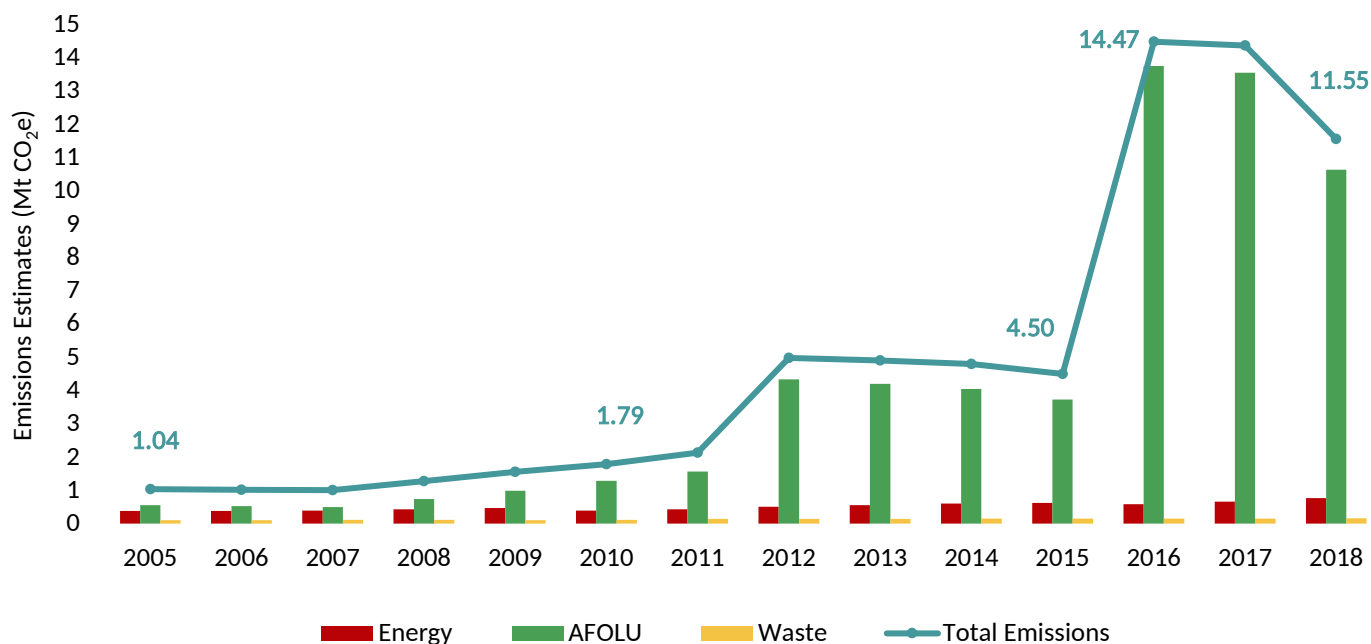
* Fuel combusted for captive electricity generation (auto-producers) and direct fuel combustion (industrial energy) has been reported under Energy sector.

Manipur at a Glance (2018)



Economy-wide Emissions Estimate

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



Emissions of Manipur increased at a CAGR of 20.37% from 1.04 Mt CO₂e in 2005 to 11.55 Mt CO₂e in 2018 (Figure 1). Manipur’s rapid growth of emissions during the reference period was due to increase in emissions from the Agriculture, Forestry and Other Land-Use (AFOLU) sector. In 2005, the share of AFOLU sector in the total economy-wide emissions of Manipur was ~53%. While the Energy and Waste sectors accounted for ~37% and ~10%, respectively. In 2018, the share of emissions from AFOLU sector increased to ~92% while that of the Energy and Waste sectors declined to ~7% and 1%, respectively (see Figure 2). No emissions from Industrial Processes and Product Use (IPPU) sector were reported in Manipur throughout the reference period.

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

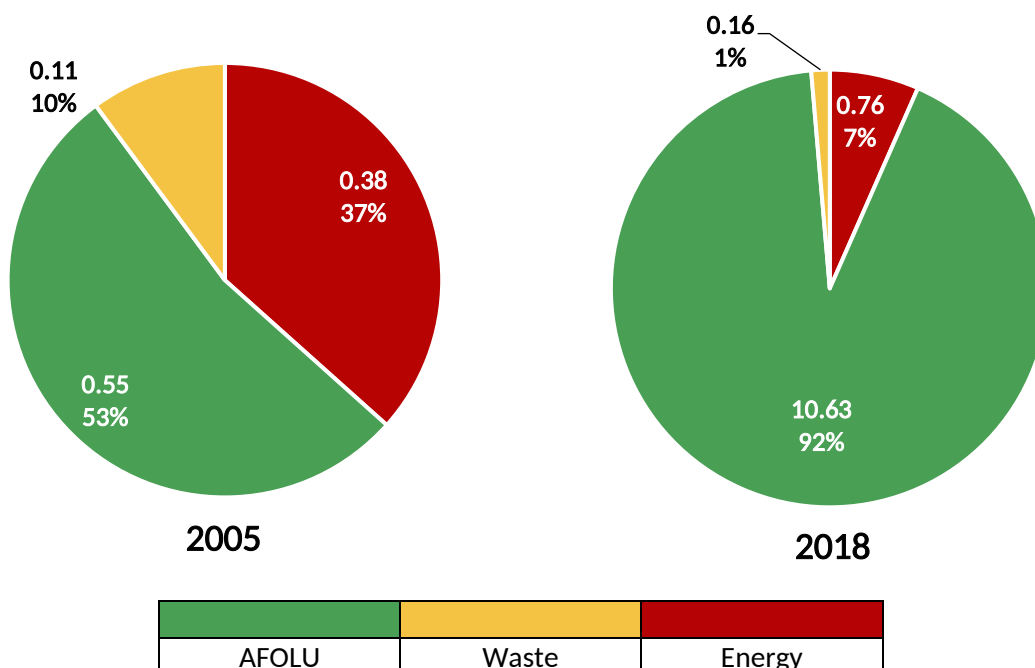
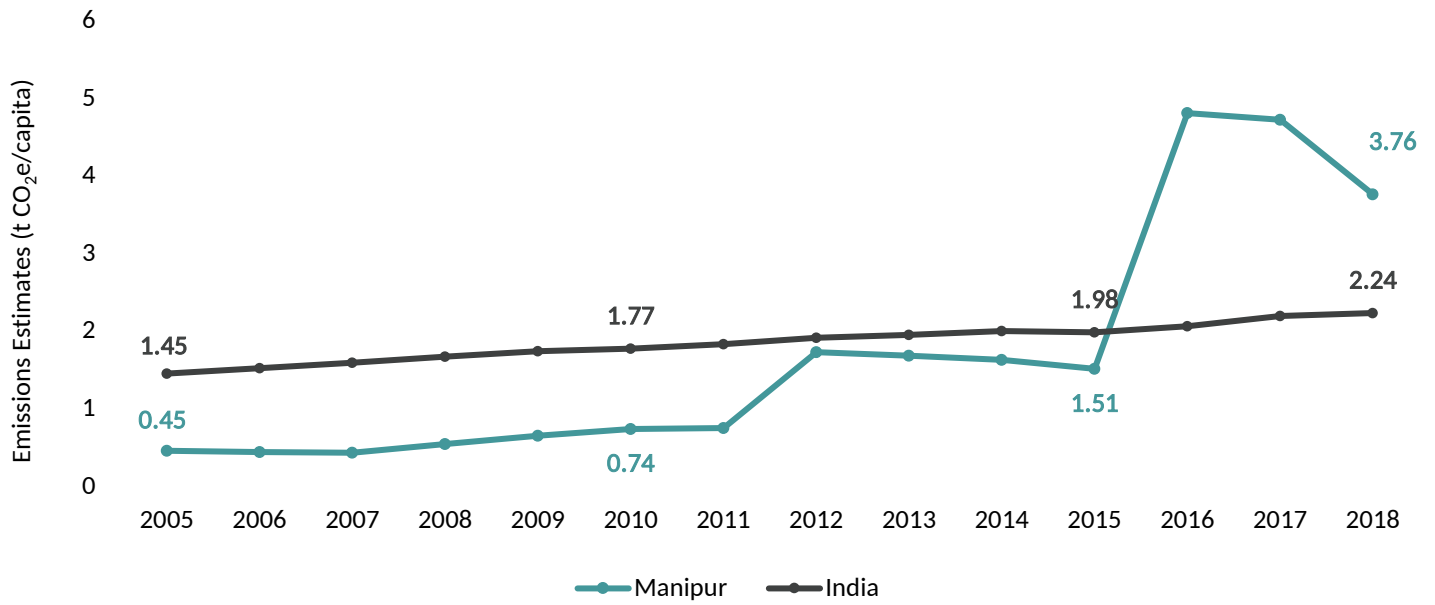


Figure 3: Per Capita GHG Emissions of Manipur and India (2005 to 2018)



The per capita emissions of Manipur were lower than India's between 2005 (0.45 Mt CO₂e) and 2015 (1.51 Mt CO₂e) as illustrated in Figure 3. Post 2015, the per capita emissions of Manipur increased significantly due to rapid growth in AFOLU sector emissions. The per capita emissions of Manipur increased at a compounded rate of 17.64% from 0.45 tCO₂e/capita in 2005 to 3.76 tCO₂e/capita in 2018, which was higher 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 Manipur accounted for ~7% of the total economy-wide emissions in 2018. Emissions from the Energy sector increased at a CAGR of 5.50% from 0.38 Mt CO₂e in 2005 to 0.76 Mt CO₂e in 2018 (see Figure 4).

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



Within the Energy sector, Transport category was the major contributor of GHG emissions with a share of ~58% of the total Energy emissions in 2018. This was followed by Residential and Agriculture categories with shares of ~32% and ~6%, respectively (see Figure 5).

Within the Fuel Combustion sub-sector, emissions from Liquid Petroleum Fuels were the major contributor to GHG emissions across the reference years, with an average share of ~66% (see Figure 6). This was followed by emissions from combustion of Other Fuels (charcoal and fuelwood) with an average share of ~18% between 2005 and 2018. Gaseous Petroleum Fuels had an average share of ~12%, while Coal contributed ~4% to the Fuel Combustion emissions during the reference period.

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

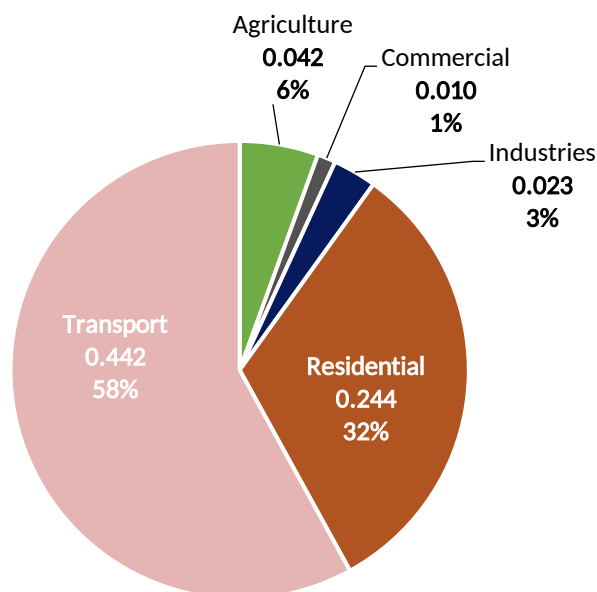
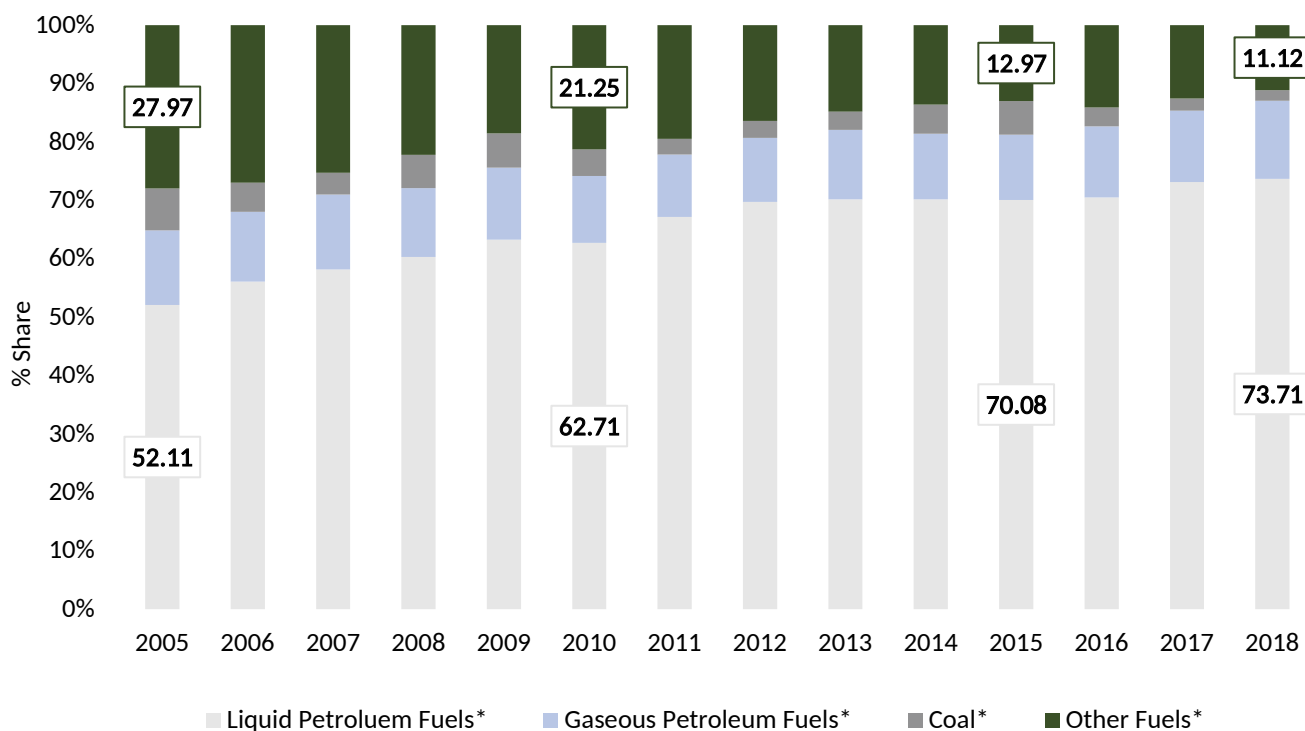


Figure 6: Percentage Share of GHG Emissions by Fuel Type due to Fuel Combustion in Energy Sector (2005 to 2018)



**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

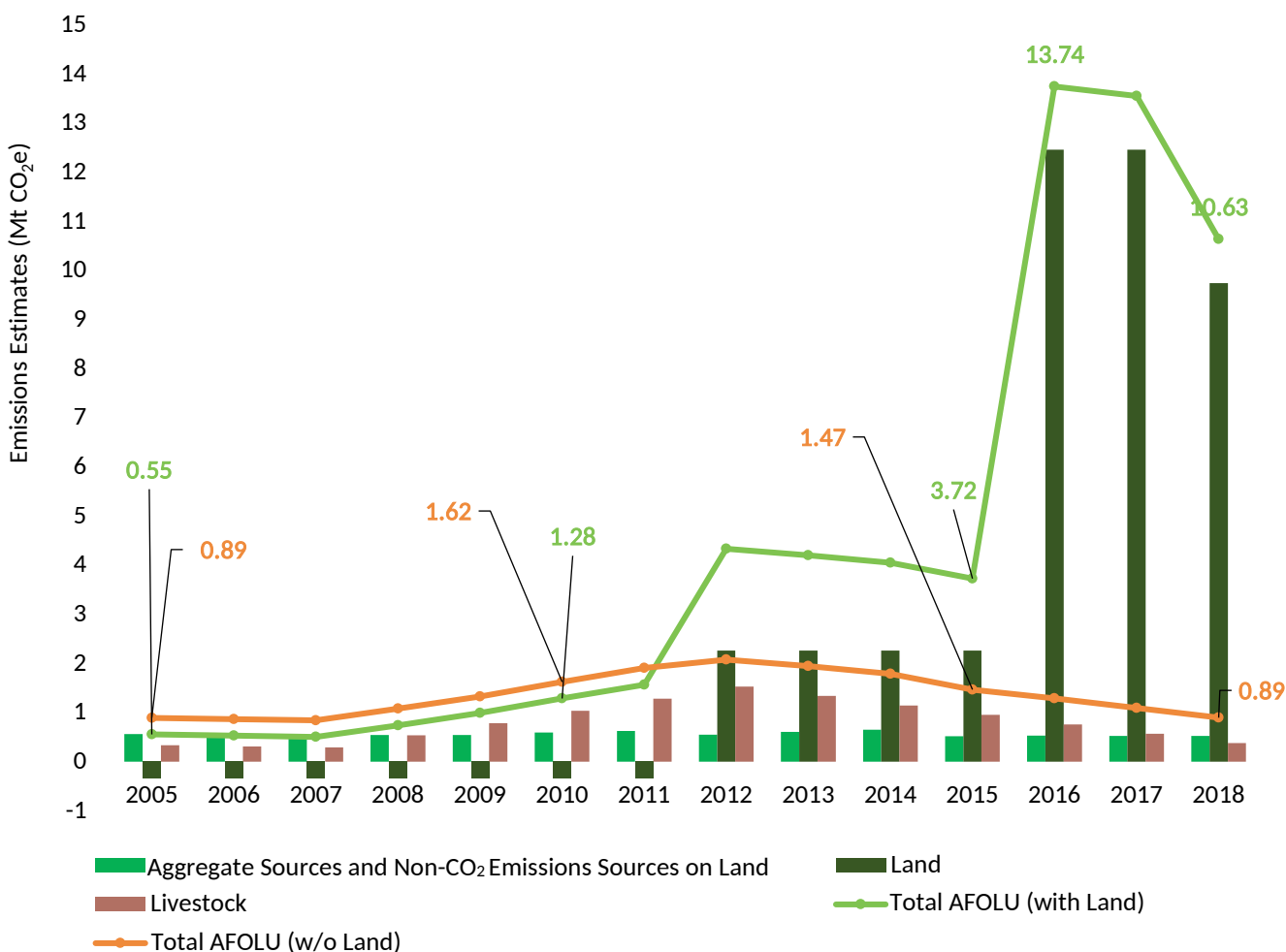
Emissions from the Industrial Processes and Product Use (IPPU) sector are largely driven by Chemical, Metal, Mineral Industries and Non-Energy Products from Fuels and Solvent Use. Industrial activities as listed by IPCC to be responsible for GHG emissions were not present in Manipur, therefore, no IPPU emissions were registered in Manipur during the reference period.



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-CO₂ Emissions Sources on Land*. AFOLU sector of Manipur represented 92% of its total economy-wide emissions in 2018. The total GHG emissions increased enormously from 0.55 Mt CO₂e in 2005 to 10.63 Mt CO₂e in 2018 (see Figure 7).

The Land sub-sector acted as a sink till 2011. Post that, the emissions from this sub-sector increased due to Land Use and Land-Use Change practices, especially in the categories of Agricultural Land, Settlements, and Other Land. Besides this, the sudden increase in Land sub-sector emissions post 2015 can be attributed to significant reduction in the forest area of the state as reported by FSI (2019 & 2021)**. In 2018, emissions from the Land sub-sector contributed to ~68% of AFOLU emissions from Manipur. The emissions from the Livestock sub-sector observed a slight increase at a CAGR of 0.95% from 0.33 Mt CO₂e in 2005 to 0.37 Mt CO₂e in 2018 while those from the Aggregate Sources and Non-CO₂ Emissions Sources on Land decreased nominally at a CAGR of 0.56% from 0.56 Mt CO₂e in 2005 to 0.52 Mt CO₂e in 2018 (see Figure 7).

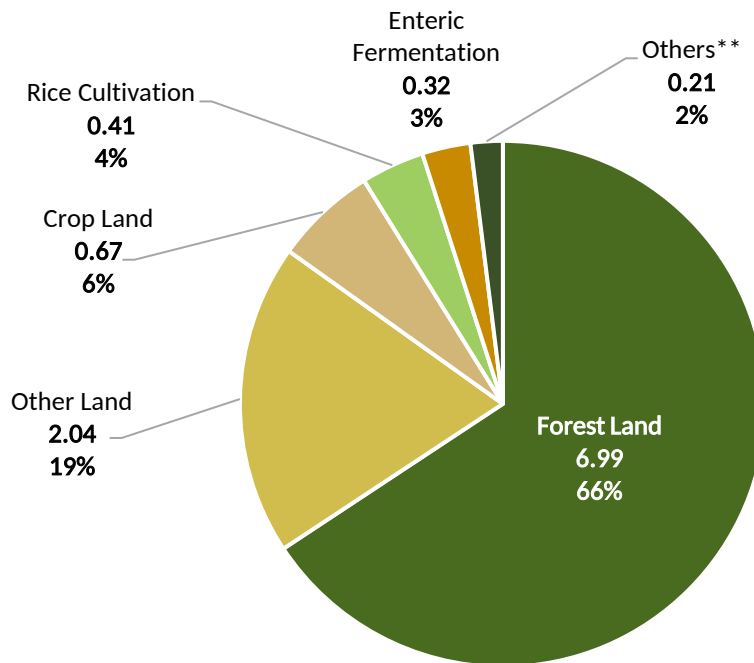
Figure 7: GHG Emissions Estimates of AFOLU Sector - Manipur (2005 to 2018)



*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

** FSI Report 2019 reports for 2017 and FSI Report 2021 reports data for 2019.

Figure 8: Category-wise Emissions (Mt CO₂e) and Percentage Share in Total AFOLU Emissions (2018)



**Others includes Agriculture Soils, Biomass Burning, Grassland, Settlements, and Manure Management

Within the Land sub-sector, Forest Land was the major contributor of emissions between 2016 and 2018. The contribution of emissions from Forest Land decreased at a rate of 15.14% (compounded annually) from 9.70 Mt CO₂e in 2016 to 6.99 Mt CO₂e in 2018. However, in 2018, Forest Land still accounted for 66% of total AFOLU emissions (see Figure 8).

Within the Livestock sub-sector, Enteric Fermentation was the highest contributor to total AFOLU emissions with a share of ~3% in 2018. Within the Aggregate Sources sub-sector, the category of Rice Cultivation was the top contributor to total AFOLU emissions with a share of ~4% in 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 1% of total economy-wide emissions of Manipur in 2018. Emissions from the Waste sector of Manipur increased at a CAGR of 3.15% from 0.11 Mt CO₂e in 2005 to 0.16 Mt CO₂e in 2018 (see Figure 9).

Figure 9: GHG Emissions Estimates of Waste Sector - Manipur (2005 to 2018)

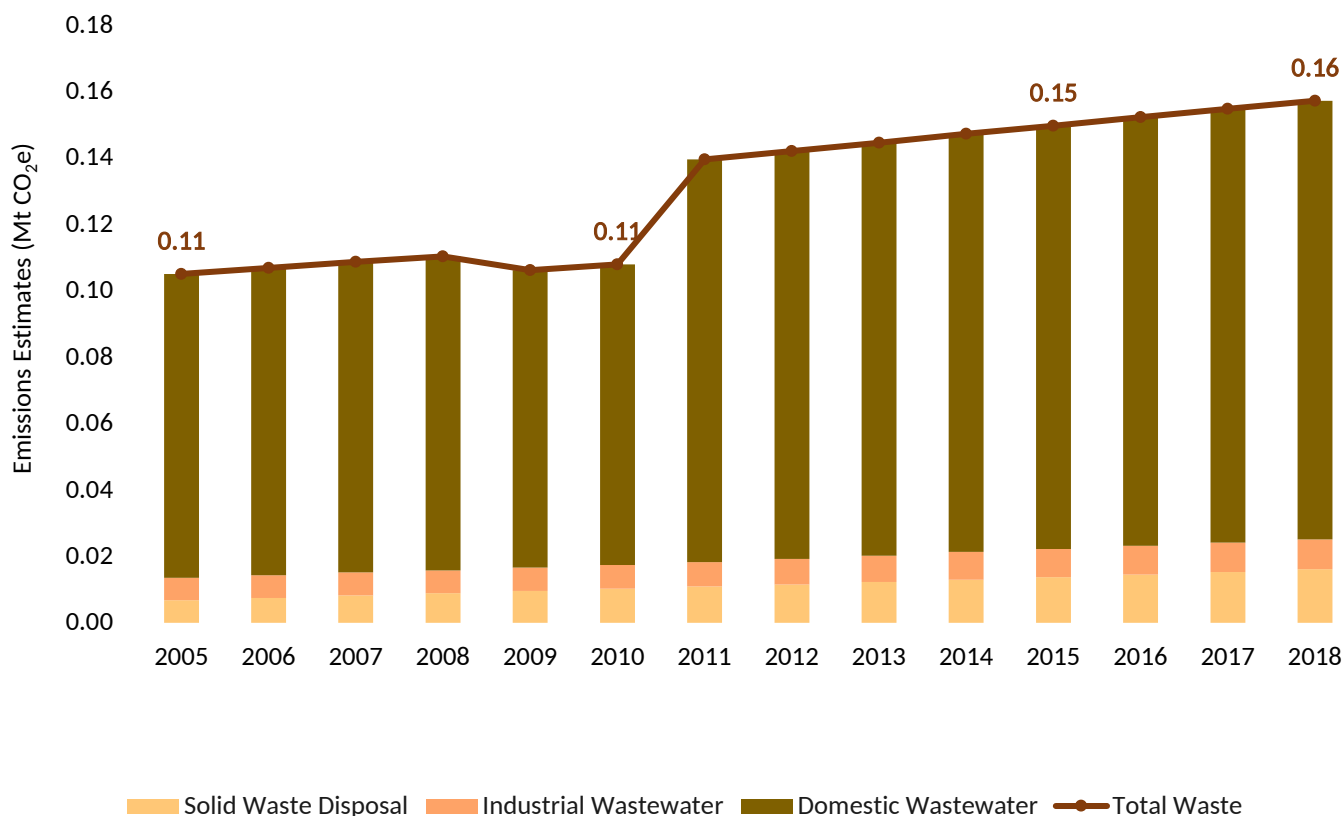
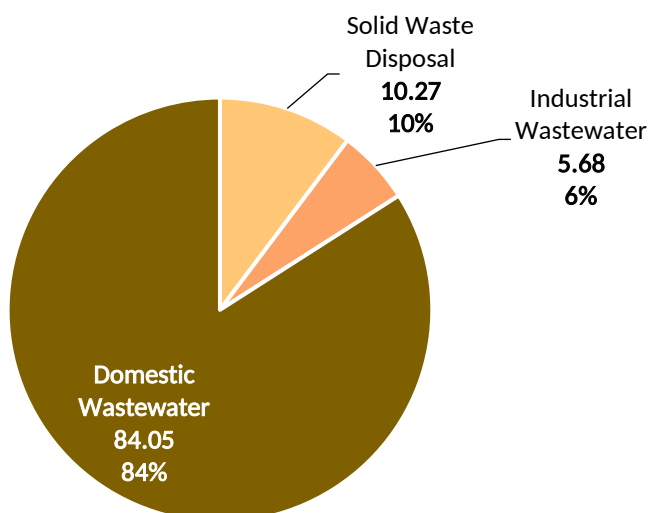


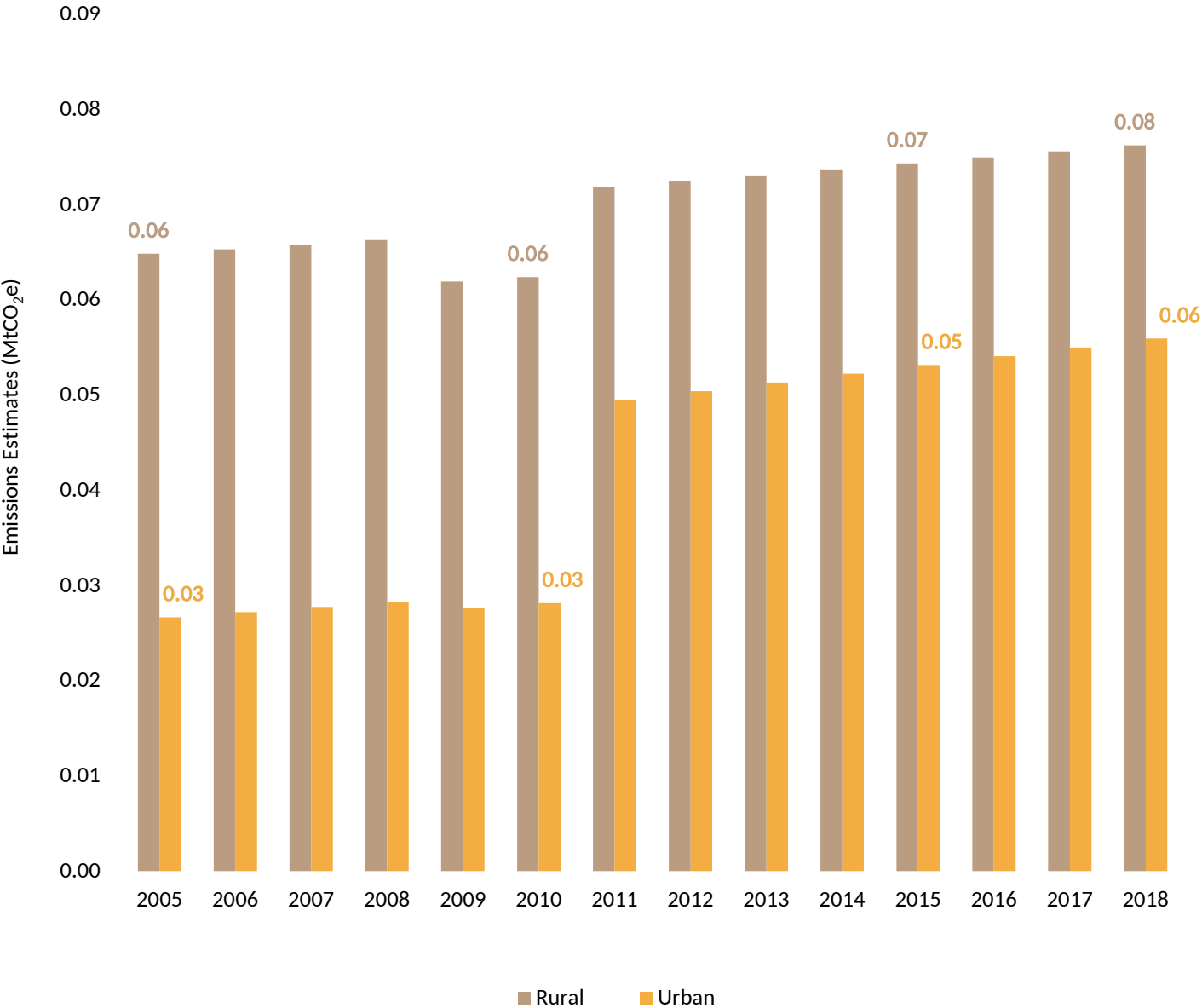
Figure 10: Sub-sector Emissions (Mt CO₂e) and Percentage Share in Total Waste Sector Emissions (2018)



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 84% in the total Waste sector emissions of Manipur in 2018. Approximately 10% of the Waste sector emissions were from Solid Waste Disposal, which grew at an estimated CAGR of 6.92% from 0.007 Mt CO₂e in 2005 to 0.016 Mt CO₂e in 2018. Industrial Wastewater accounted for nearly 6% of the Waste sector emissions in 2018 and grew at a CAGR of 2.10% from 0.007 Mt CO₂e in 2005 to 0.009 Mt CO₂e in 2018 (see Figure 10).

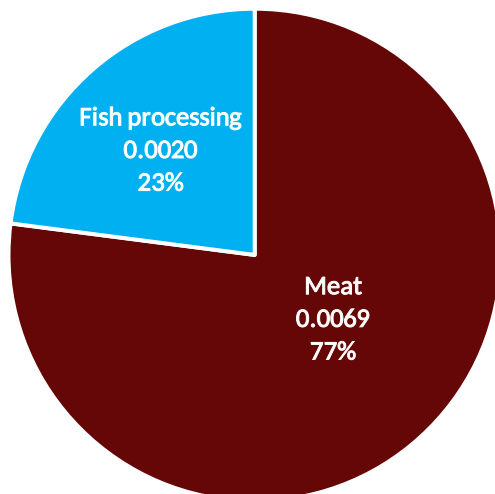
Emissions from Domestic Wastewater of both rural and urban areas grew at a CAGR of 2.87% from 0.091 Mt CO₂e in 2005 to 0.132 Mt CO₂e in 2018. Almost ~58% of Domestic wastewater emissions were from the rural areas of Manipur in 2018 as shown in Figure 11.

Figure 11: Area-wise GHG Emissions Estimates of Domestic Wastewater (2005 to 2018)



The Meat Industry was the major contributor to Industrial Wastewater emissions with a share of ~77% in 2018. This was followed by Fish Processing with a share of ~23% in 2018 (see Figure 12).

Figure 12: 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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