

# Trend Analysis of GHG Emissions of MEGHALAYA

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

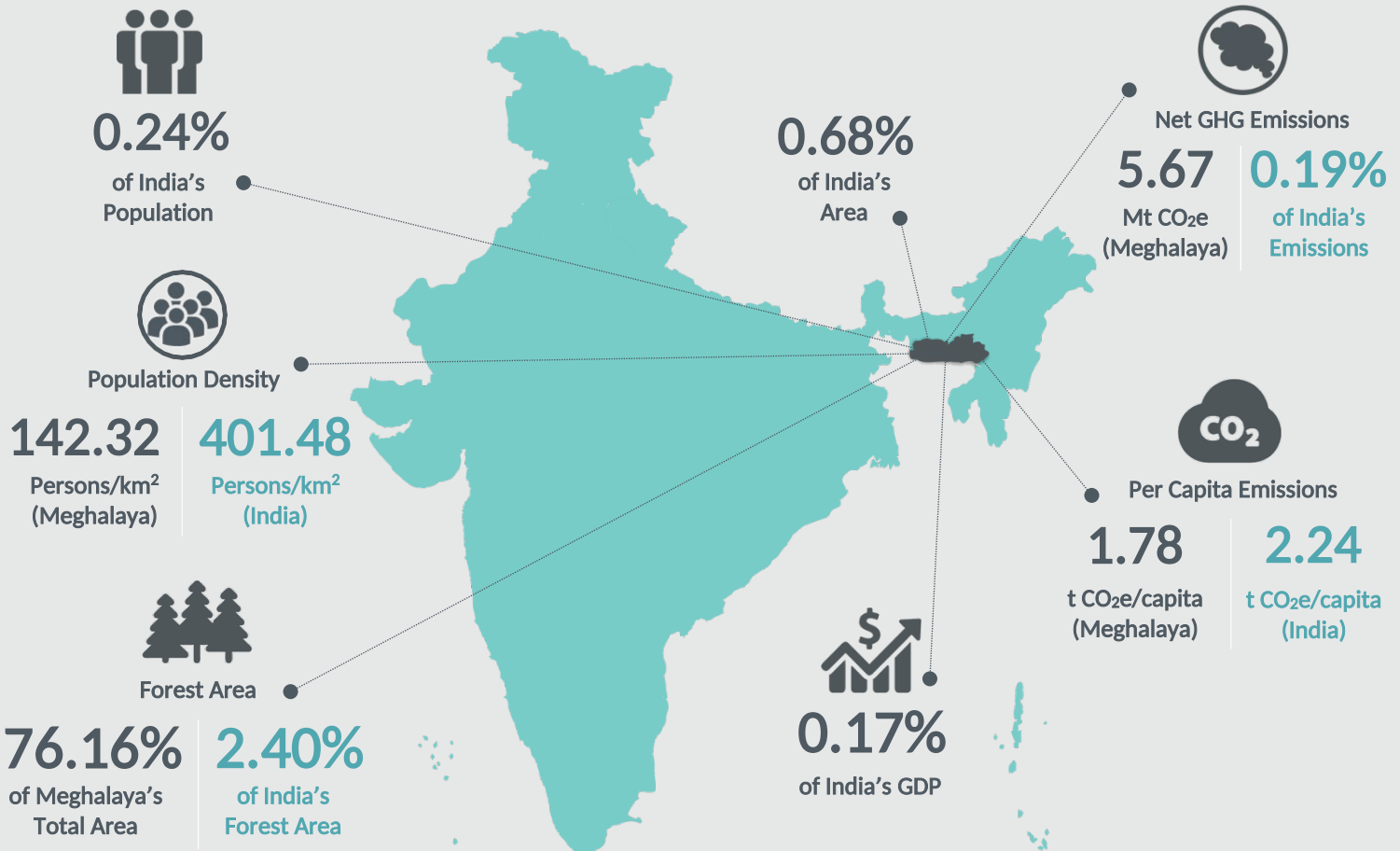
The Platform aims to add value to the various ongoing GHG emissions estimation efforts by addressing existing data gaps and data accessibility issues, broadening the scope of national inventories to include state inventories, and increasing the volume of analytics and policy dialogue on India's GHG emissions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

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



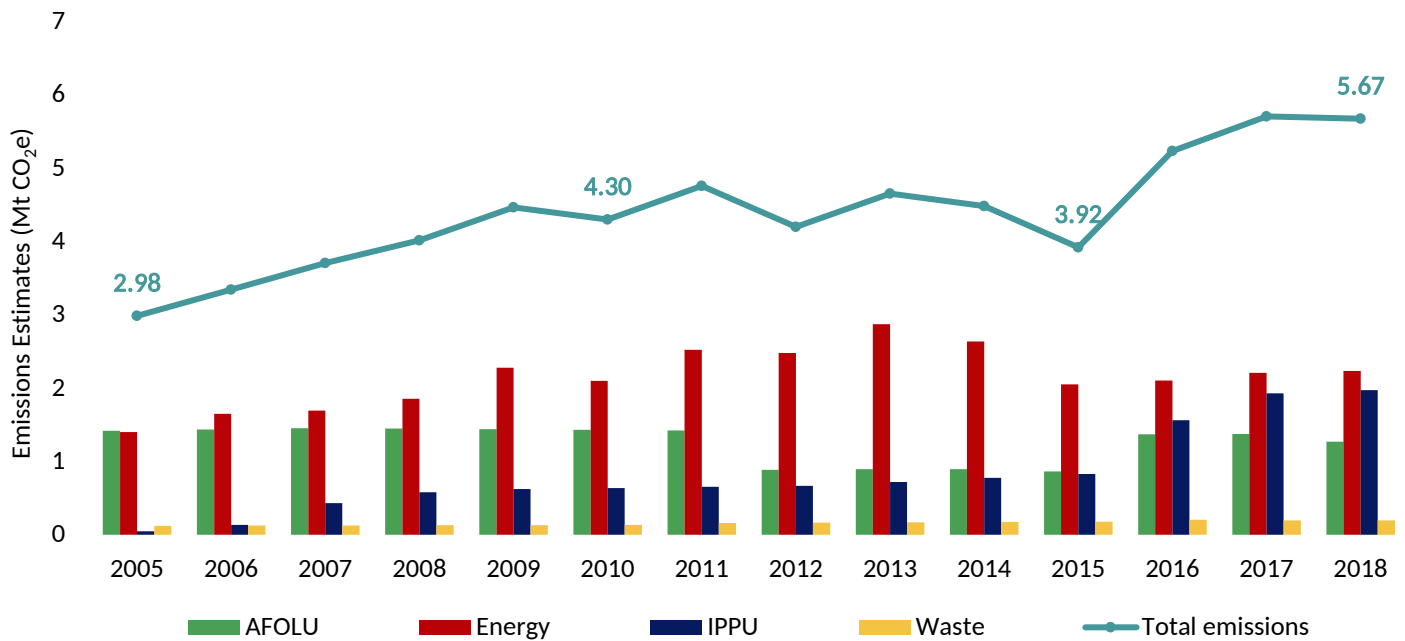
\* Fuel combusted for captive electricity generation (auto-producers) and direct fuel combustion (industrial energy) has been reported under Energy sector.

## Meghalaya at a Glance (2018)



# Economy-wide Emissions Estimates

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



Emissions of Meghalaya increased from 2.98 Mt CO<sub>2</sub>e in 2005 to 5.67 Mt CO<sub>2</sub>e in 2018 at a CAGR of 5.06% (see Figure 1). The share of emissions from the Energy sector in economy-wide emissions decreased from ~47% in 2005 to ~39% in 2018, while the share of emissions from Agriculture, Forestry and Other Land-Use (AFOLU) sector decreased from ~48% in 2005 to ~22% in 2018. However, the Industrial Processes and Product Use (IPPU) sector emissions increased from ~1% in 2005 to ~35% in 2018. The rise in IPPU emissions since 2016 was particularly striking. The share of Waste sector emissions in the economy-wide emissions remained constant (~4%) in the reference years (see Figure 2).

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

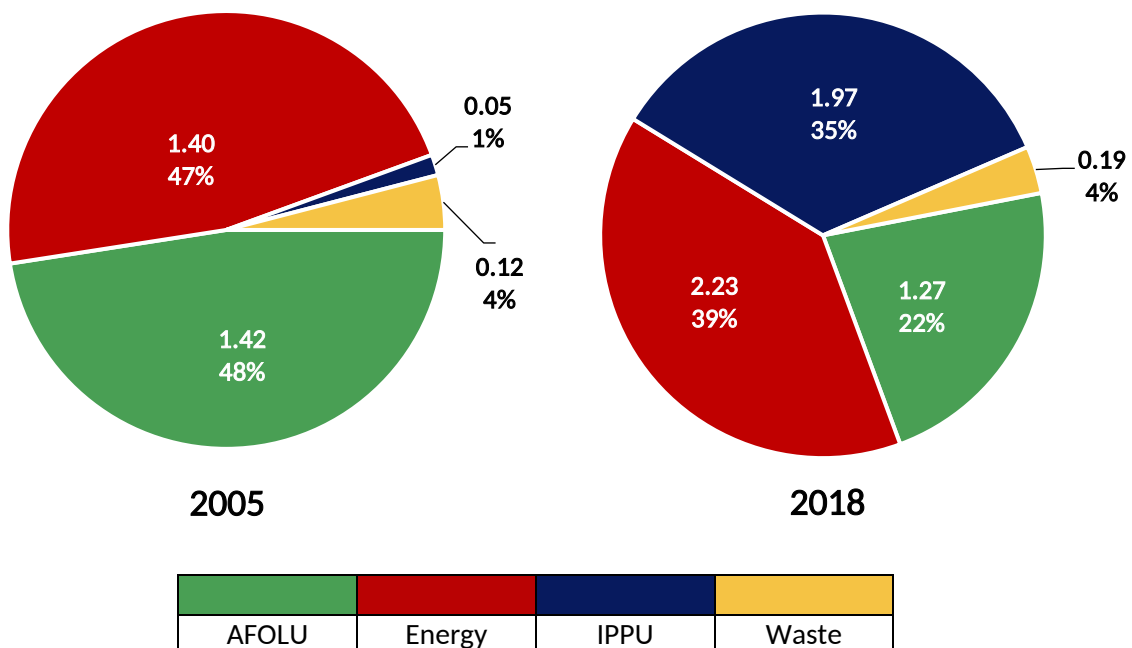
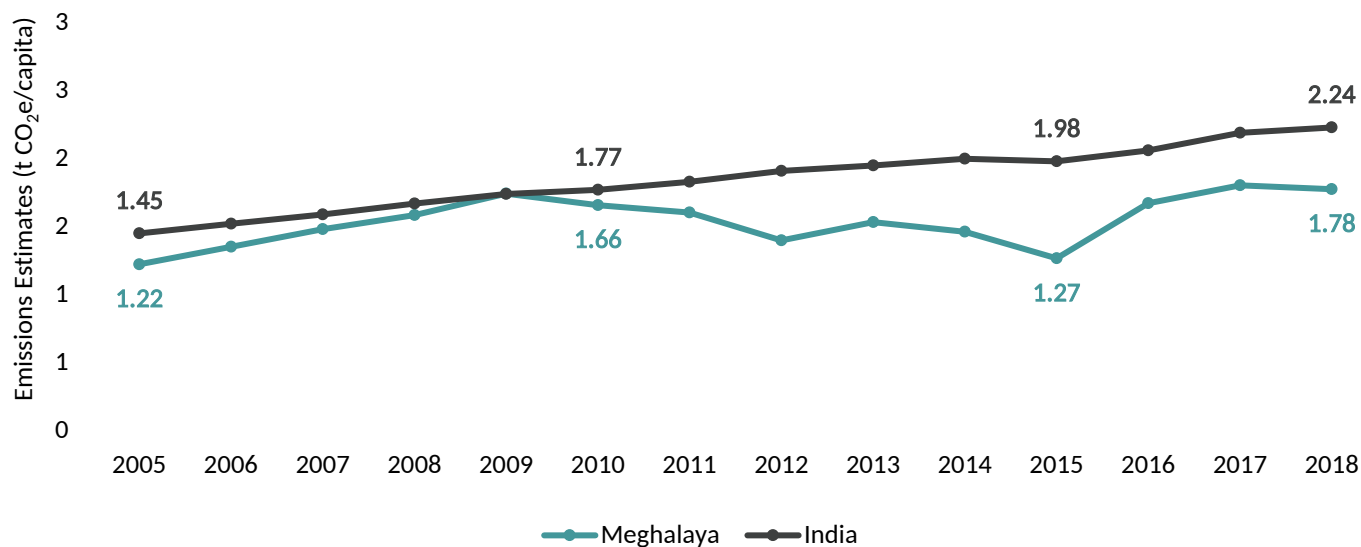


Figure 3: Per Capita GHG Emissions of Meghalaya and India (2005 to 2018)



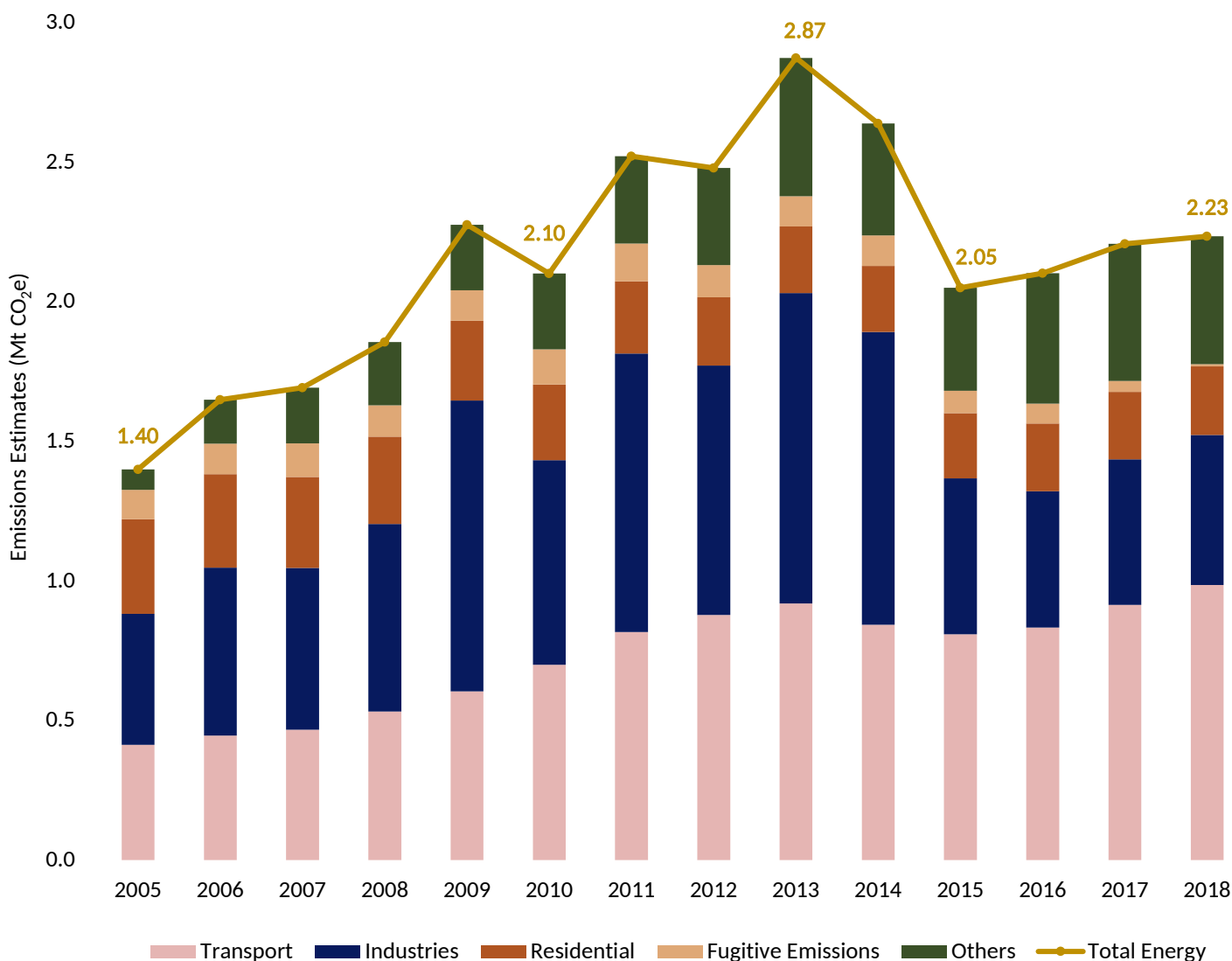
Per capita emissions of Meghalaya were lower than the per capita emissions of India for all the years in the reference period, except for 2009, when the State’s value coincided with the country’s per capita emissions value (see Figure 3). Meghalaya’s per capita emissions increased at a CAGR of 2.91%, from 1.22 t CO<sub>2</sub>e per capita in 2005, to 1.78 t CO<sub>2</sub>e per capita in 2018 which was lower than 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 Meghalaya accounted for ~39% of the total economy-wide emissions in 2018. Emissions from the Energy sector increased at a CAGR of 3.67% from 1.40 Mt CO<sub>2</sub>e in 2005, to 2.23 Mt CO<sub>2</sub>e in 2018 (see Figure 4). However, since 2015, energy emissions of Meghalaya slowed down significantly.

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



Within the Energy sector, Transport category was the major contributor of GHG emissions with a share of ~44% of total Energy emissions in 2018. This was followed by Industrial Energy (~24%), Residential (~11%), Agriculture (~11%) and Captive Power Plants (~9%) categories (see Figure 5).

Within the Fuel Combustion sub-sector, Liquid Petroleum Fuels were the major contributor to GHG emissions across the reference years, with an average share of ~52%. This was followed by emissions from Coal, with an average share of ~38% between 2005 and 2018. Gaseous Petroleum Fuels had an average share of ~2%, while Other Fuels accounted for ~8% of the Fuel Combustion emissions during the reference period (see Figure 6).

Figure 5: Category-wise Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total Energy Sector Emissions (2018)

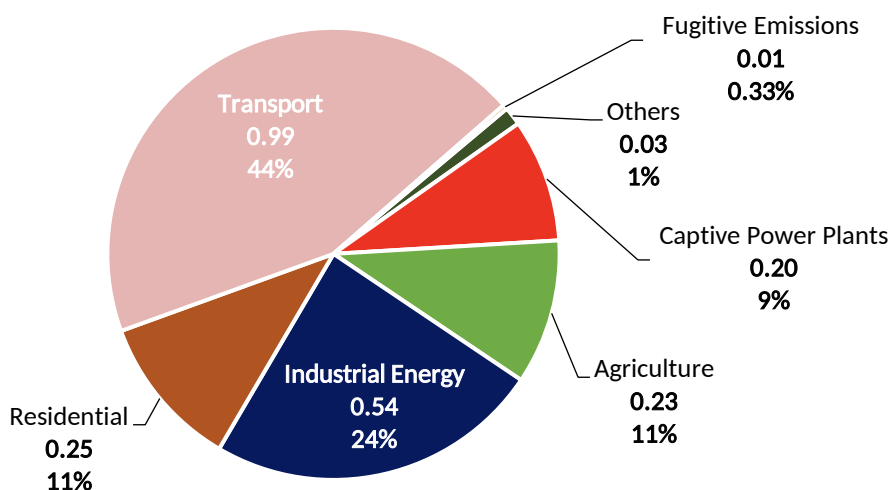
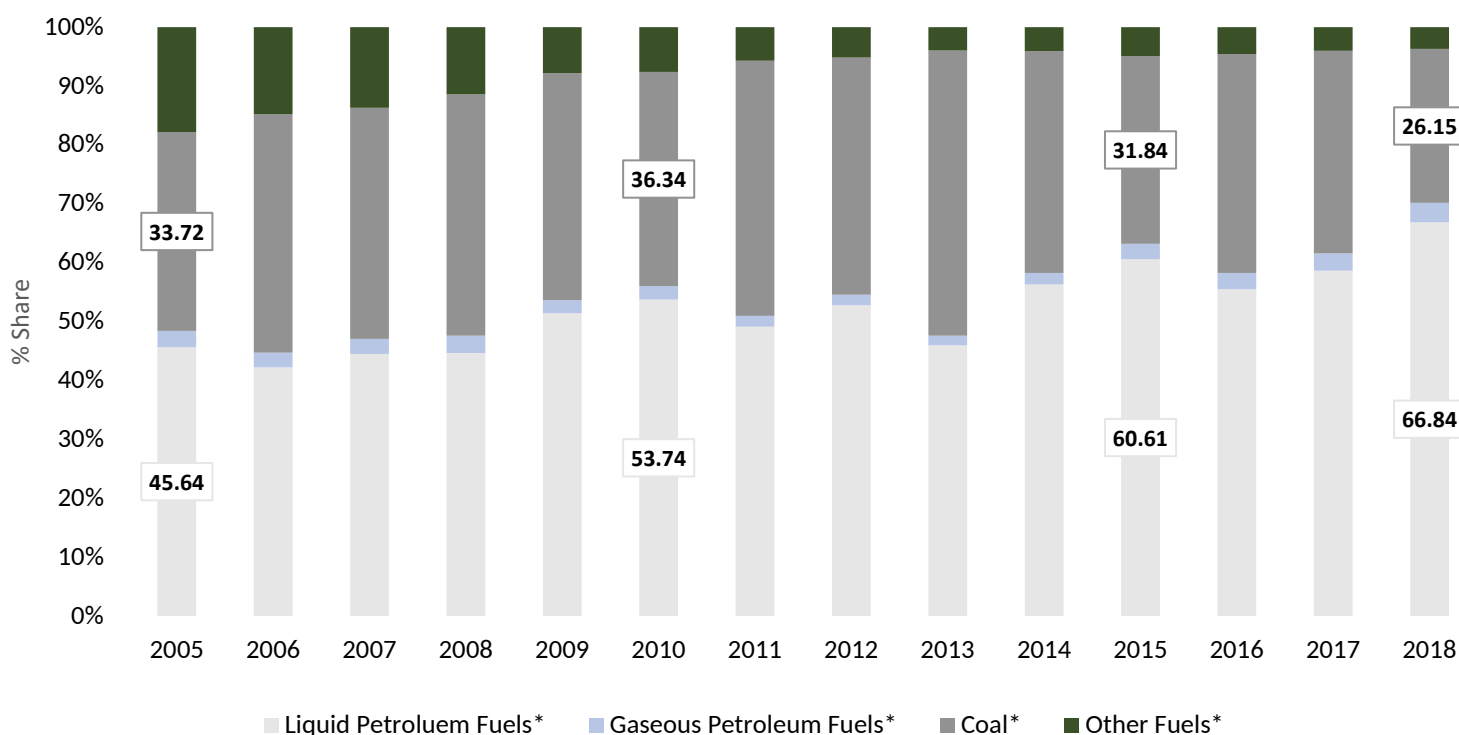


Figure 6: Percentage Share of GHG Emissions by Fuel Type due to Fuel Combustion in Energy Sector (2005 to 2018)



**\*Notes:**

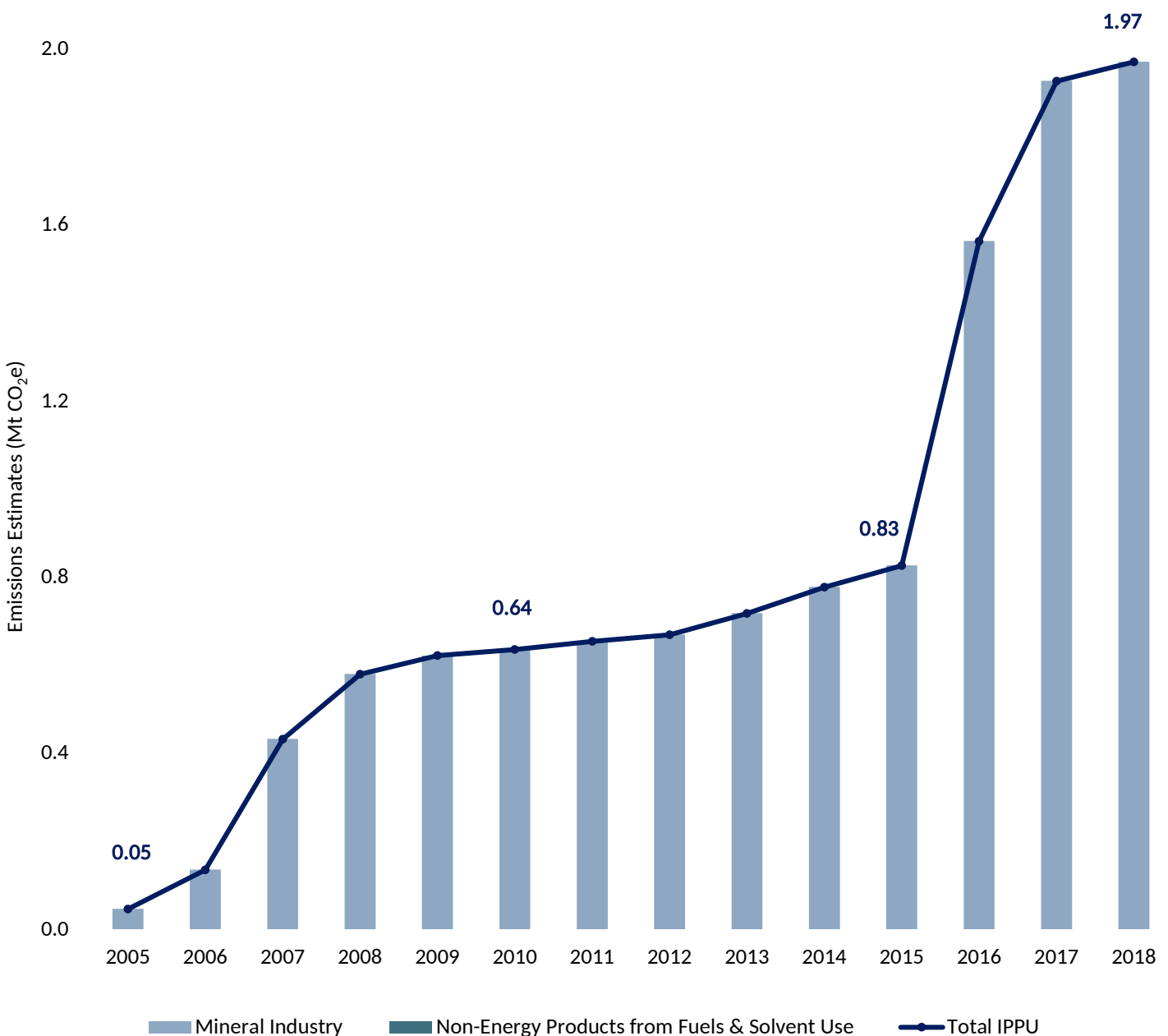
1. Liquid Petroleum Fuels - ATF, diesel, kerosene, motor spirit and other liquid fuels
2. Gaseous Petroleum Fuels - natural gas, LPG and other gaseous fuels
3. Coke is included in Coal because the bifurcation of pet-coke and coke was not available
4. Other Fuels comprises of firewood and charcoal



## IPPU Sector

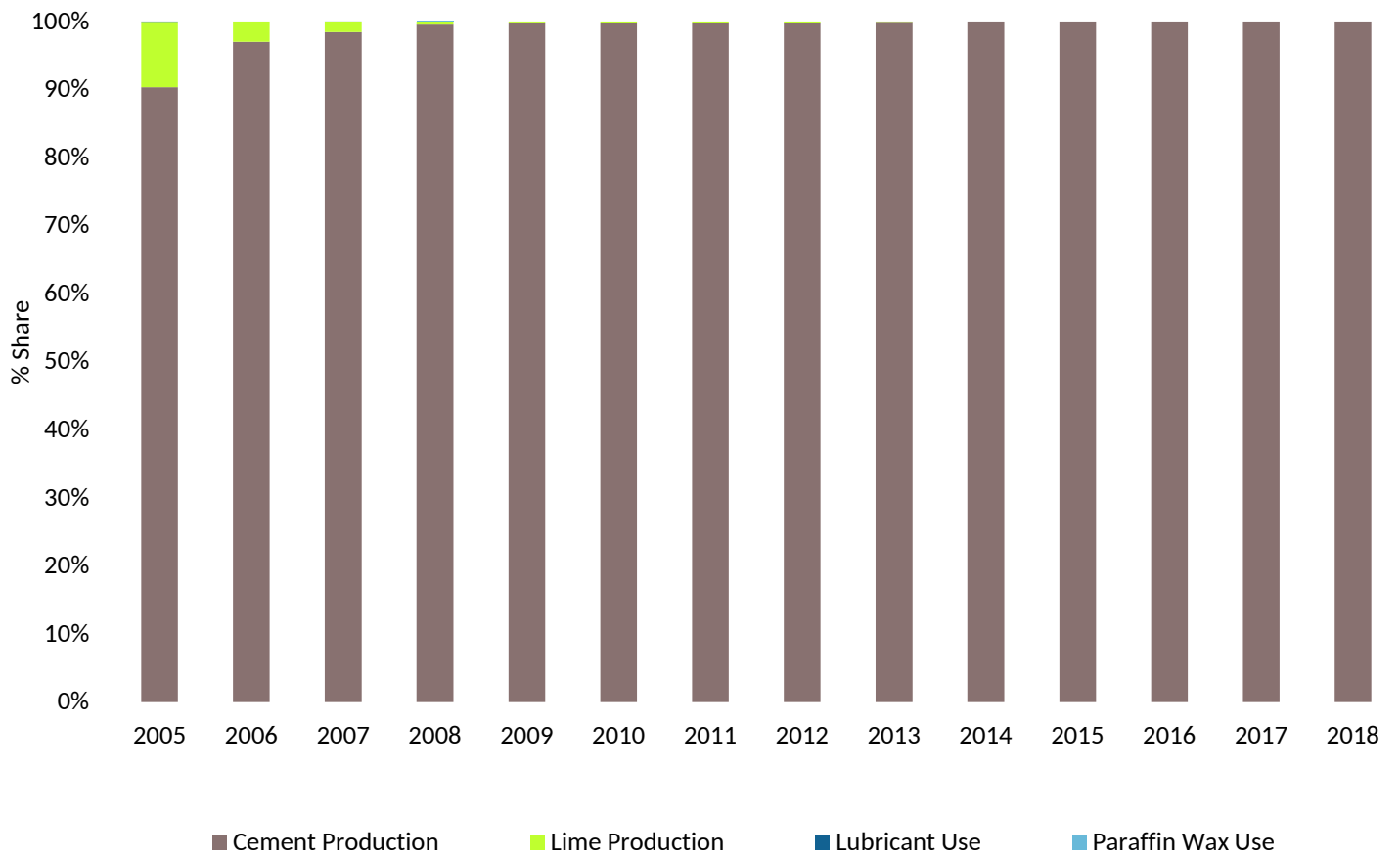
Emissions from the Industrial Processes and Product Use (IPPU) sector are largely driven by Chemical, Metal, Mineral Industries and Non-Energy Products from Fuels and Solvent Use. In 2018, Meghalaya's IPPU sector represented ~35% of total economy-wide emissions. Between 2005 and 2018, the overall IPPU emissions increased at a CAGR of 33.59%, from 0.05 Mt CO<sub>2</sub>e in 2005, to 1.97 Mt CO<sub>2</sub>e in 2018. Since 99% of the State's IPPU emissions emanated from Mineral Industry sub-sector, this sub-sector's growth rate remains identical to overall IPPU emissions growth rate. Peaks in IPPU emissions after 2015 can be attributed to increase in emissions from Mineral Industry sub-sector, primarily from the Cement Production category (see Figure 7). Emissions from the Non-Energy Products from Fuels and Solvent Use increased at a CAGR of 18.60% during the reference period, however, their quantum of emissions was negligible when compared to the Mineral Industry sub-sector, hence they are not visible in the following graphs.

Figure 7: GHG Emissions Estimate of IPPU Sector - Meghalaya (2005 to 2018)



Cement Production, a key contributor to the Meghalaya's IPPU emissions, accounted for almost 100% share of overall IPPU sector emissions in 2018. However, in 2005, share of emissions from Lime Production category was ~10 % of the total IPPU emissions, before it started declining (see Figure 8).

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



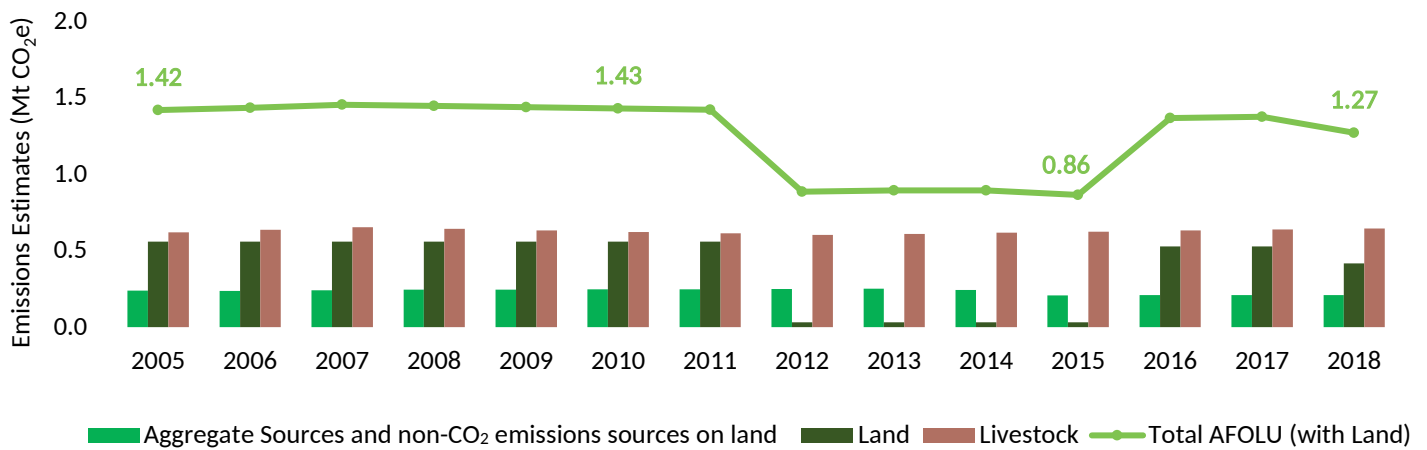


# AFOLU Sector

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\*. The AFOLU sector represented ~22% of Meghalaya’s total economy-wide emissions in 2018.

Between 2011 and 2015, emissions from the Land sub-sector decreased significantly. This decline in the Land sub-sector emissions was due to significant reduction in emissions across Agricultural Land, Grassland, Other Land and Settlements categories. Later, in 2016 and 2017, emissions from the Land sub-sector increased, returning to almost 2011 levels, due to decrease in the State’s Forest cover, resulting in an overall spike in AFOLU emissions after 2016

**Figure 9: GHG Emissions Estimates of AFOLU Sector - Meghalaya (2005 to 2018)**

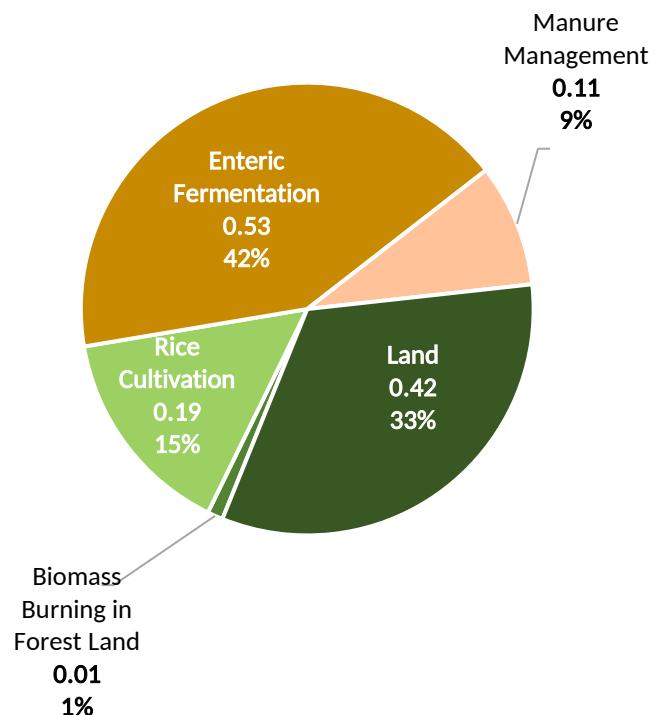


Emissions from the Land sub-sector decreased from 0.56 Mt CO<sub>2</sub>e in 2005 to 0.42 Mt CO<sub>2</sub>e in 2018 at a rate of 2.24% (compounded annually). In 2018, this sub-sector had a share of 33% of Meghalaya’s total AFOLU emissions (see Figure 10). Agricultural Land and Forest Land categories were the major contributors to emissions from the Land sub-sector throughout the reference period.

In 2018, Livestock sub-sector had the maximum share of ~51% of Meghalaya’s total AFOLU emissions. Within the Livestock sub-sector, Enteric Fermentation category was the major contributor to total AFOLU emissions, with an average share of ~44% throughout the reference period. The emissions from this category increased nominally at a CAGR of 0.15% from 0.52 Mt CO<sub>2</sub>e in 2005, to 0.53 Mt CO<sub>2</sub>e in 2018.

The share of total AFOLU emissions from Rice Cultivation increased from ~13% in 2005 to ~15% in 2018. Whereas, the share of emissions from Biomass Burning in Forest Land decreased from ~3% in 2005 to ~1% in 2018 (see Figures 10 and 11).

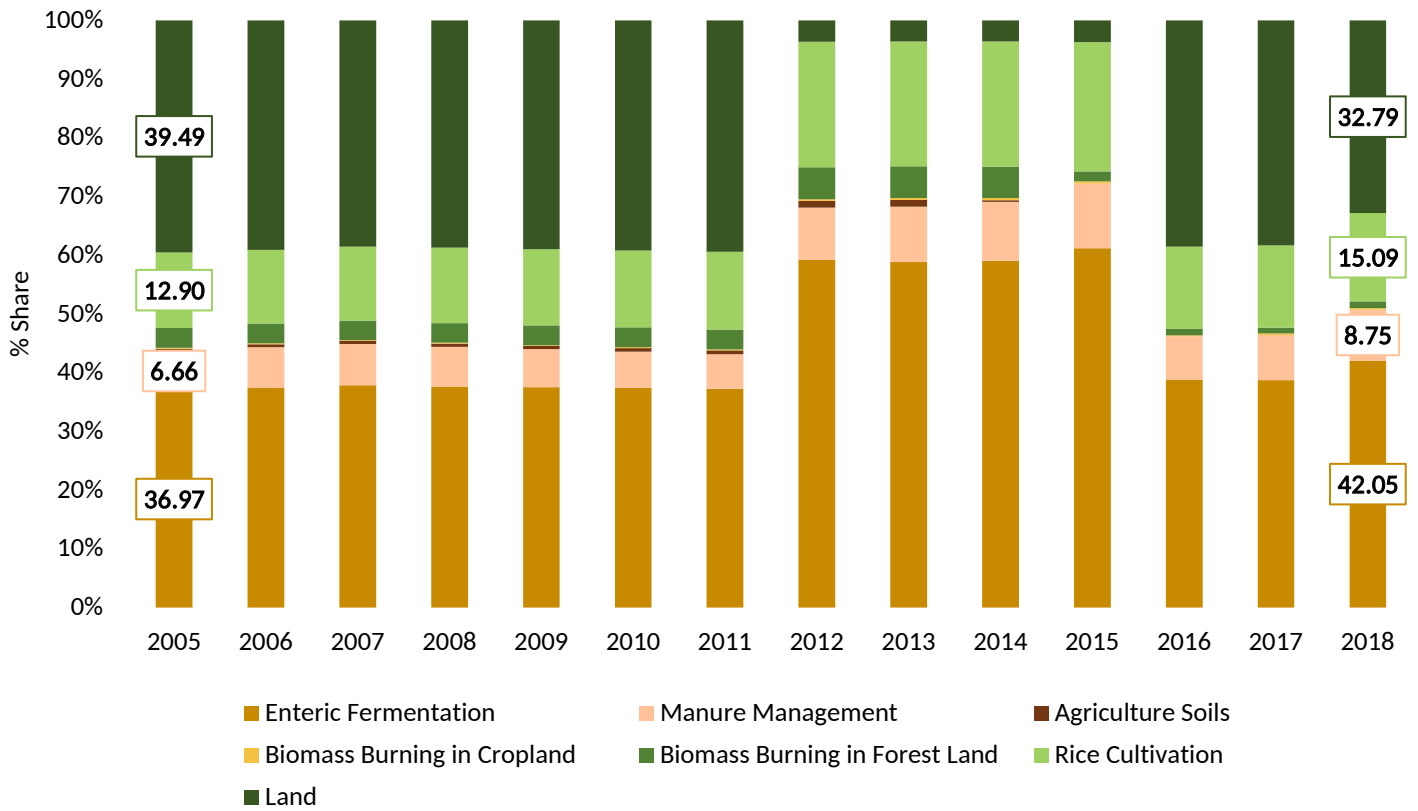
**Figure 10: Sub-sector/Category-wise Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total AFOLU Emissions (2018)**



\* 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.



Figure 11: Sub-sector/Category-wise Percentage Share of Total AFOLU Emissions (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 the total economy-wide emissions of Meghalaya in 2018. Emissions from the Waste sector of Meghalaya grew at a CAGR of 3.75%, from 0.12 Mt CO<sub>2</sub>e in 2005 to 0.19 Mt CO<sub>2</sub>e in 2018 (see Figure 12).

Figure 12: GHG Emissions Estimates of Waste Sector - Meghalaya (2005 to 2018)

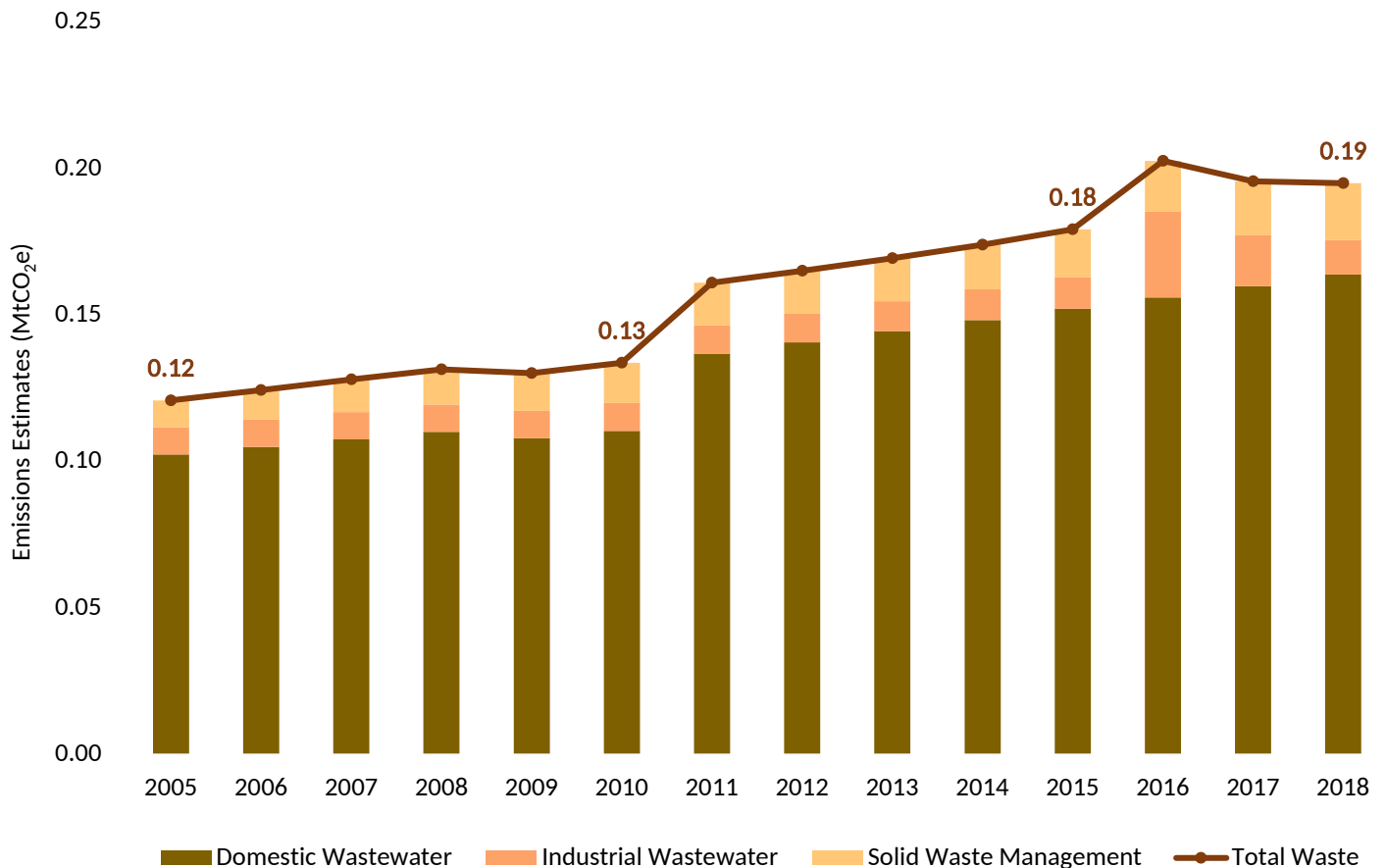
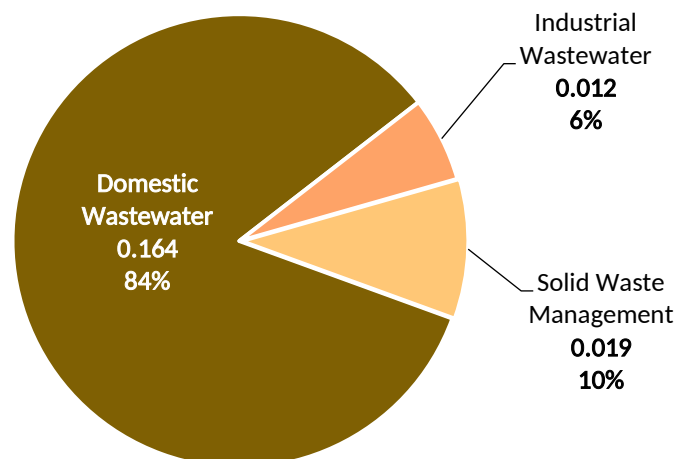


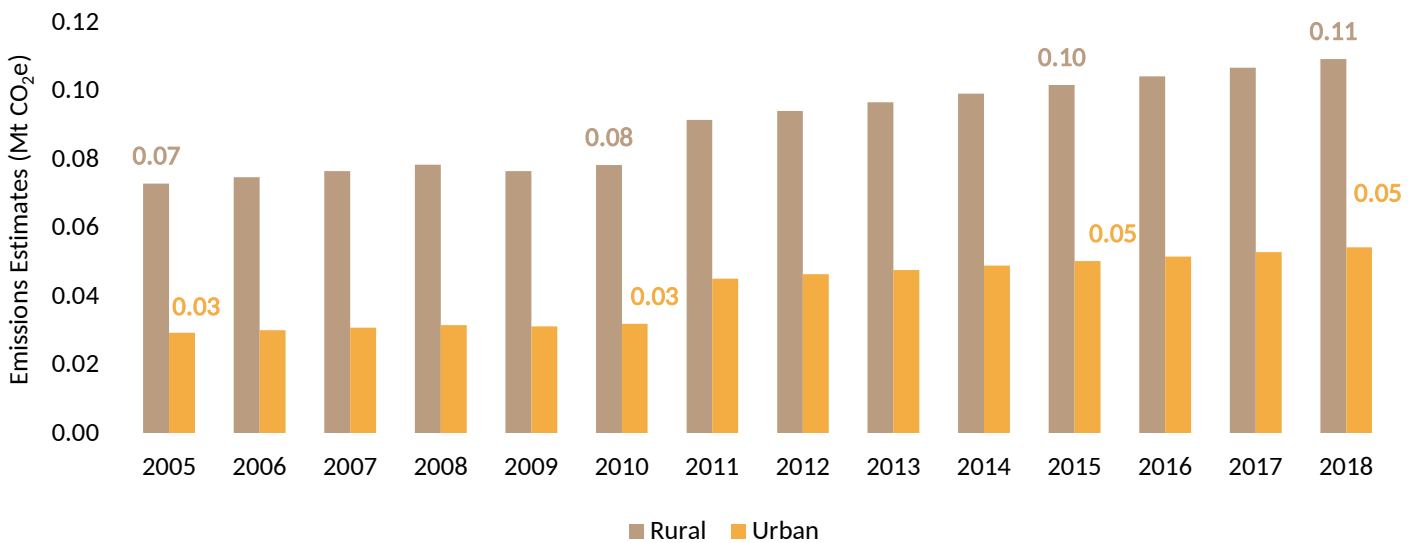
Figure 13: Sub-sector Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total Waste Sector Emissions (2018)



Discharge of untreated wastewater and use of septic tanks are the key drivers of emissions in the Domestic Wastewater sub-sector. Domestic Wastewater had a share of 84% in the total Waste sector emissions of Meghalaya in 2018. Approximately, 10% of the Waste sector emissions were from Solid Waste Disposal, which grew at an estimated CAGR of 6.01% from 0.01 Mt CO<sub>2</sub>e in 2005 to 0.02 Mt CO<sub>2</sub>e in 2018. Industrial Wastewater accounted for nearly 6% of Waste sector emissions in 2018, and increased at a CAGR of 1.82% from 0.09 Mt CO<sub>2</sub>e in 2005 to 0.012 Mt CO<sub>2</sub>e in 2018 (see Figure 13).

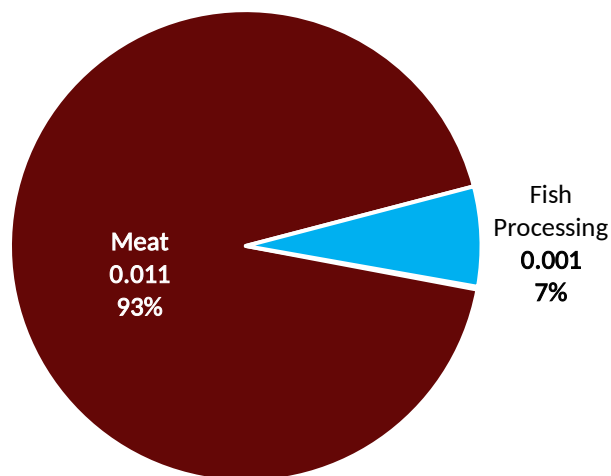
Emissions from Domestic Wastewater of both rural and urban areas increased at a CAGR of 3.68%, from 0.10 Mt CO<sub>2</sub>e in 2005, to 0.16 Mt CO<sub>2</sub>e in 2018. Almost 67% of Domestic wastewater emissions were from rural areas of Meghalaya in 2018 (see Figure 14).

**Figure 14: Area-wise GHG Emissions Estimates of Domestic Wastewater (2005 to 2018)**



The Meat Industry was the major contributor under Industrial Wastewater emissions with a share of ~93% in 2018. This was followed by Fish Processing (~7%), as illustrated in Figure 15.

**Figure 15: Category-wise Emissions (Mt CO<sub>2</sub>e) 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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