Trend Analysis
of GHG Emissions of
NAGALAND

GHG Platform INDIA

GHG Platform India is a civil society initiative providing an independent estimation and analysis of India's Greenhouse Gas (GHG) emissions across key sectors.
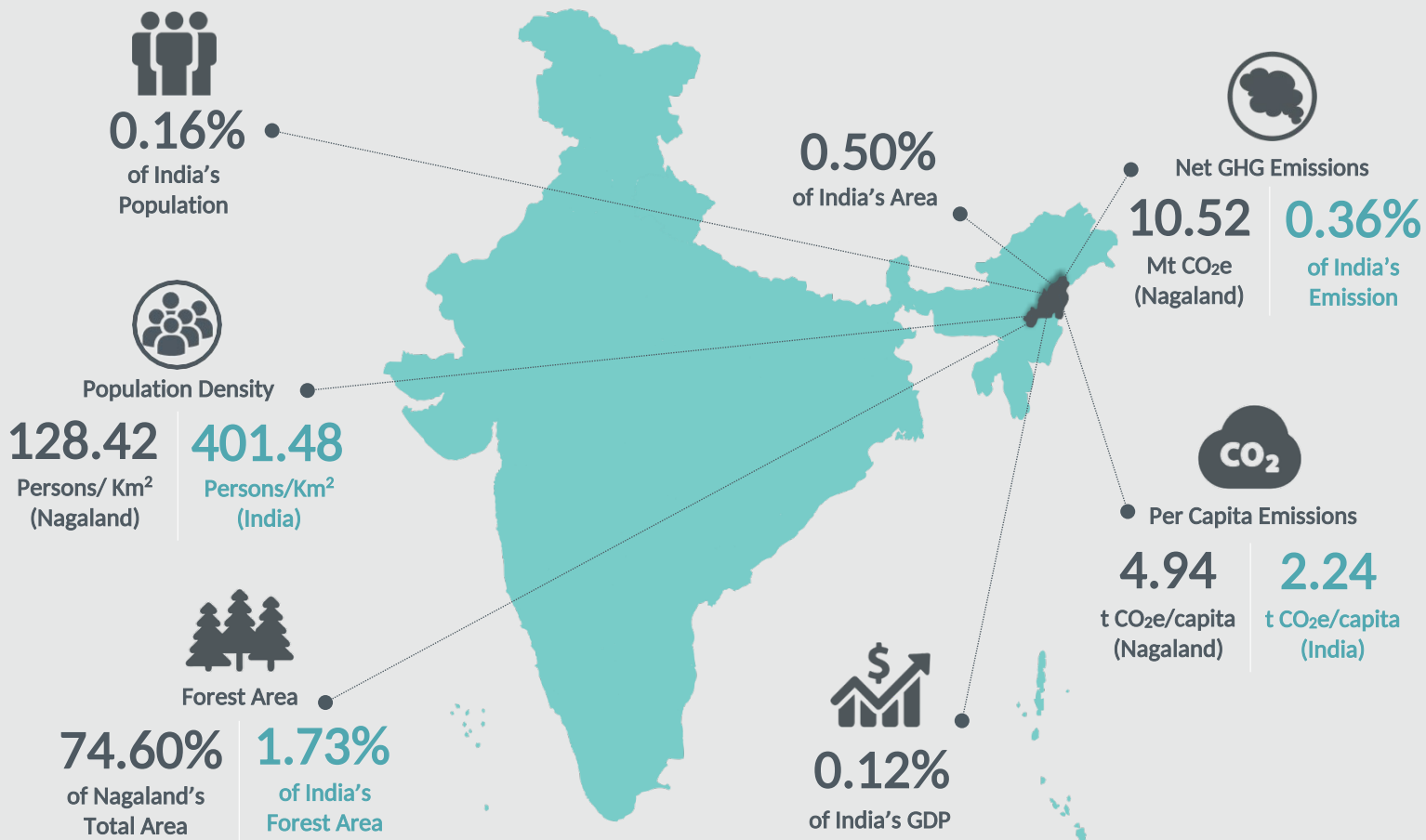
The Platform seeks to add value to the various ongoing GHG emissions estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's GHG emissions sources, profile, and related policies.

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

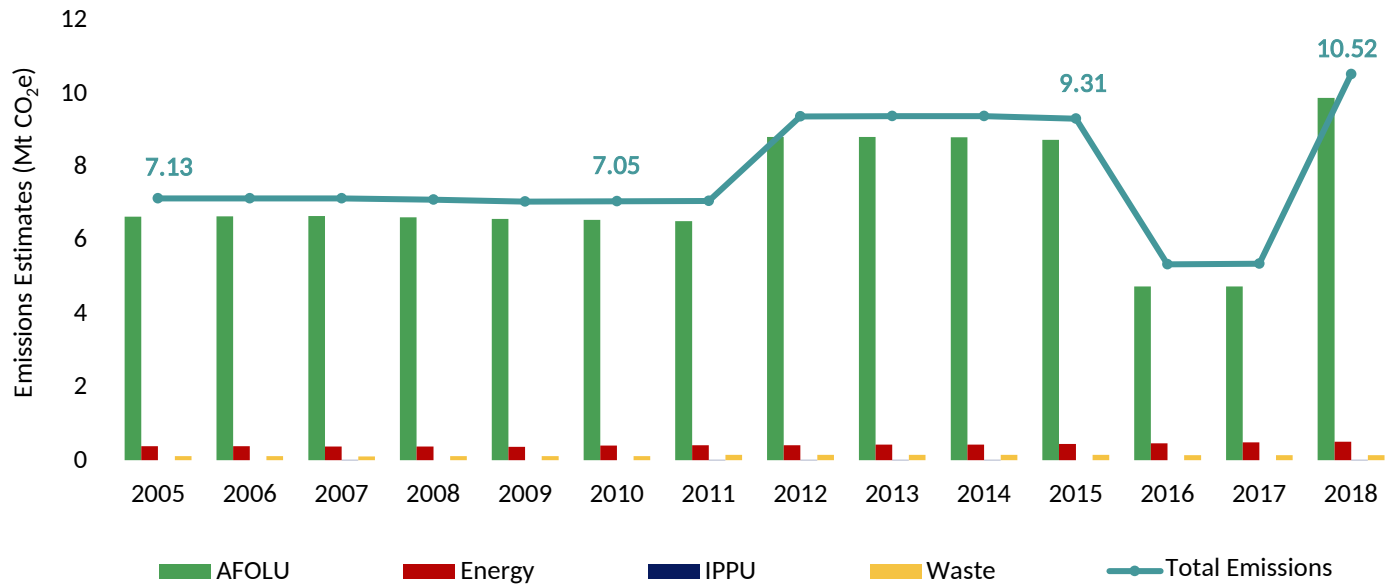**ENERGY**   **IPPU***   **AFOLU**   **WASTE**

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

Nagaland at a Glance (2018)

0.16%
of India's Population

0.50%
of India's Area

Net GHG Emissions
10.52
Mt CO_2e
(Nagaland)

0.36%
of India's Emission

Population Density
128.42
Persons/ Km^2
(Nagaland)

401.48
Persons/Km^2
(India)

Per Capita Emissions
4.94
t CO_2e/capita
(Nagaland)

2.24
t CO_2e/capita
(India)

Forest Area
74.60%
of Nagaland's Total Area

1.73%
of India's Forest Area

0.12%
of India's GDP

*Mt CO_2e – Million Tonnes of Carbon Dioxide Equivalent | CAGR – Compound Annual Growth Rate

*The map represents the data for 2018

Economy-wide Emissions Estimates

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

Emissions in Nagaland grew at a CAGR of 3.04% from 7.13 Mt CO_2e in 2005 to 10.52 Mt CO_2e in 2018. Emissions increased post 2011 and then decreased significantly in 2016 and 2017 (see figure 1). The Agriculture, Forestry and Other Land Use (AFOLU) sector was the major contributor to Nagaland's total economy-wide emissions throughout the reference years. Its share in total economy-wide emissions increased from ~93% in 2005 to 94% in 2018. The share of emissions from Waste sector reduced from ~2% in 2005 to ~1% in 2018, while the share of emissions from Energy sector was observed to be ~5% in both 2005 and 2018 as illustrated in Figure 2. The Industrial Processes and Product Use (IPPU) sector led to negligible emissions throughout the reference period.

Figure 2: Sector-wise Contribution (Mt CO_2e) and Percentage Share in Economy-wide GHG Emissions of Nagaland
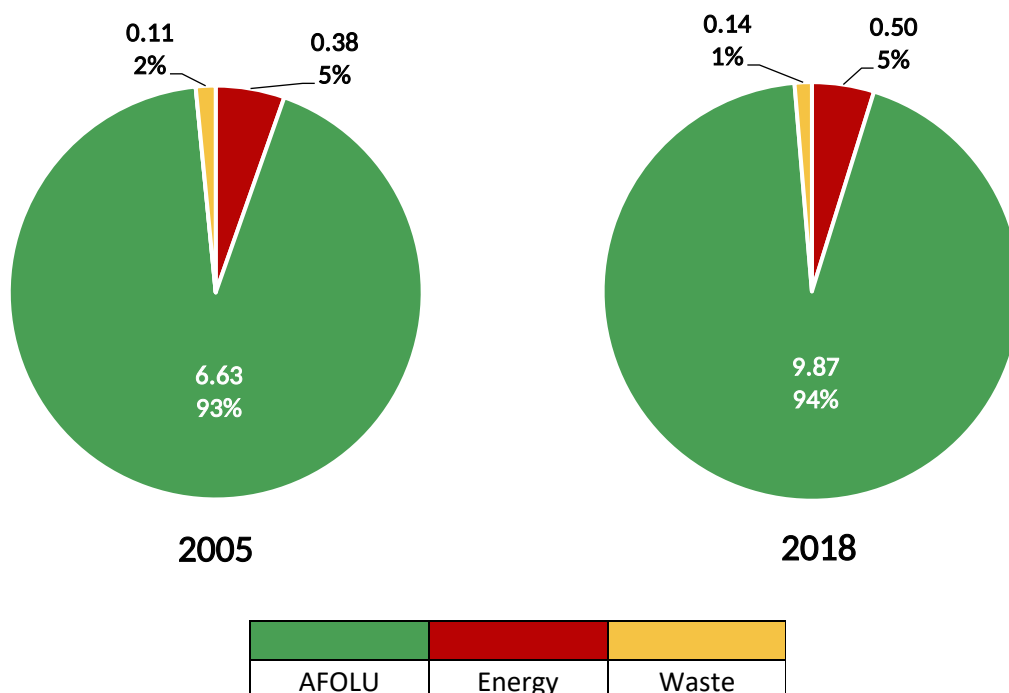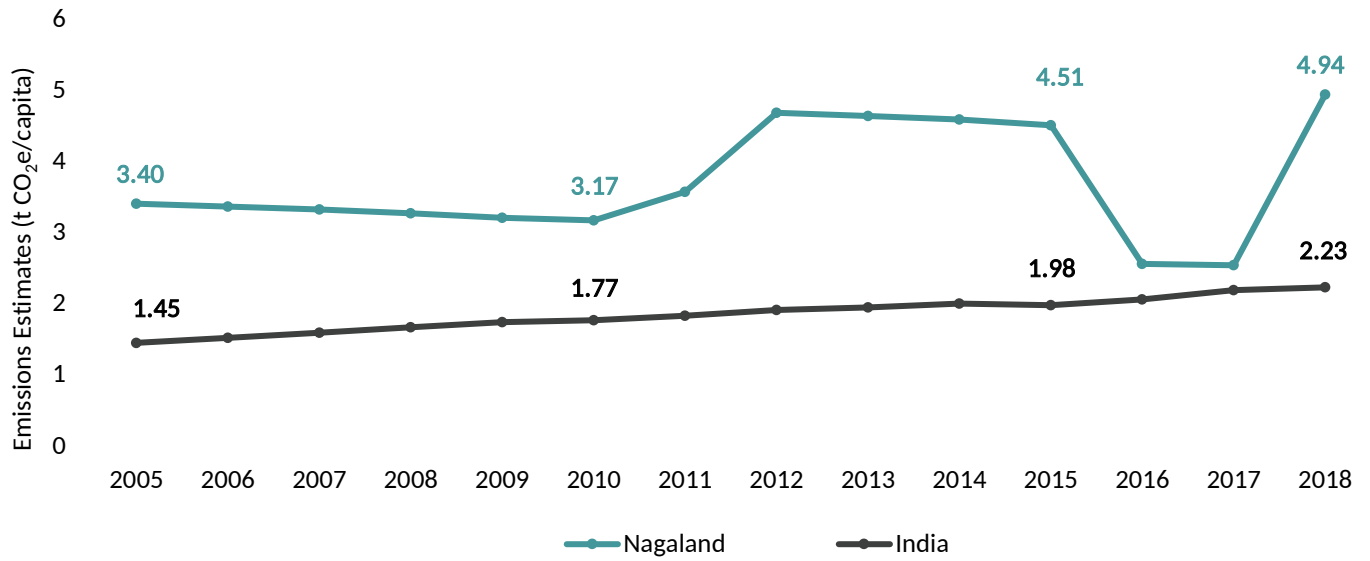

2005

2018

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

The per capita emissions of Nagaland were higher than the per capita emissions of India. However, they increased at a compounded rate of 2.91% from 3.40 t CO_2e/capita in 2005 to 4.94 t CO_2e/capita in 2018, which was lower than that of India (~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. Energy sector represented ~5% of the total emissions of Nagaland in 2018. Rise in Energy sector emissions throughout the reference period could be attributed entirely to the Fuel Combustion sub-sector as there were no emissions from the Fugitive sub-sector. The Energy sector emissions increased at a CAGR of ~2.14% from 0.38 Mt CO_2e in 2005 to 0.50 Mt CO_2e in 2018 as illustrated in Figure 4 below.

Figure 4: GHG Emissions Estimates of Energy Sector - Nagaland (2005 to 2018)
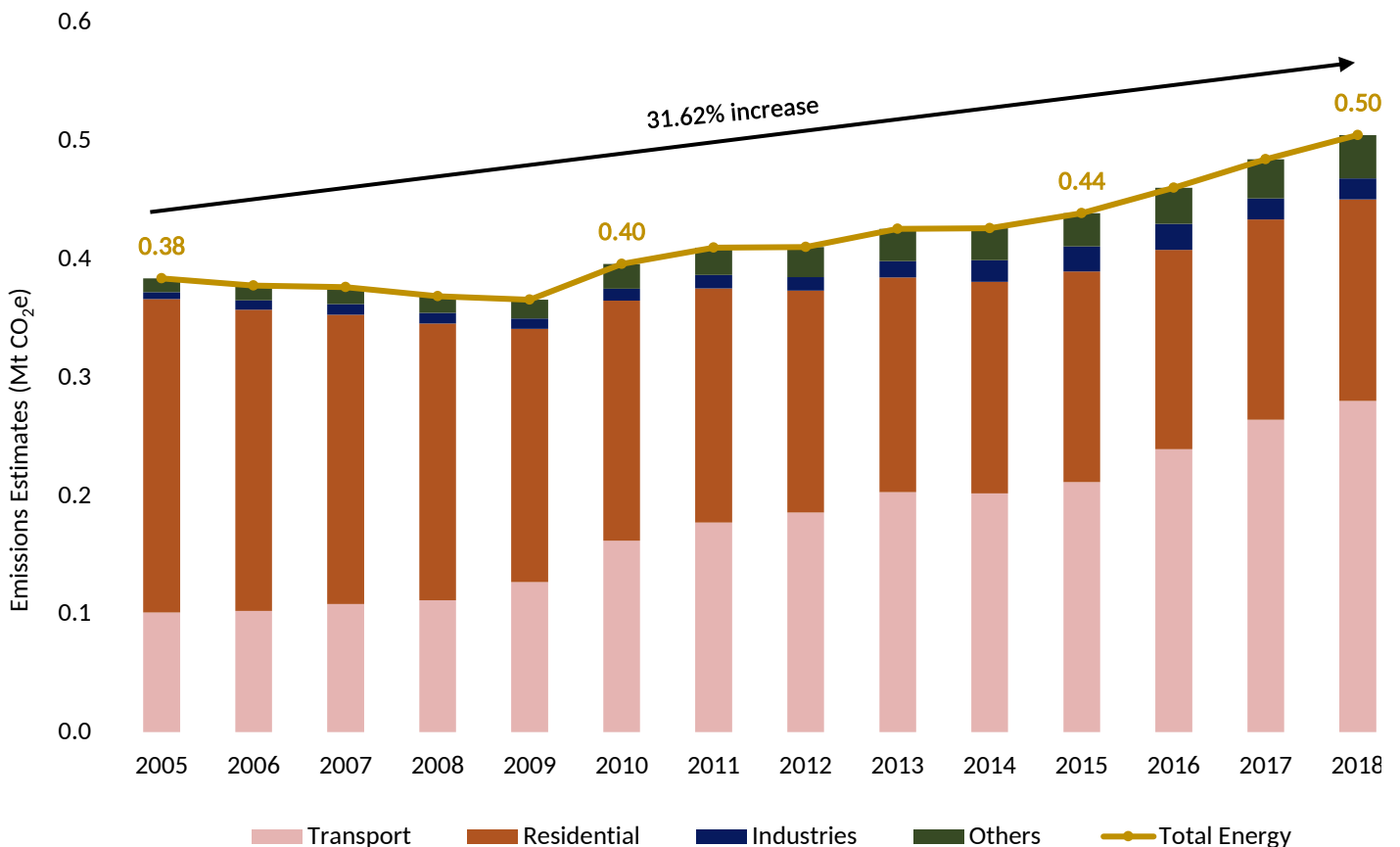
Within the Energy sector, Transport category was the major contributor to total Energy emissions with a share of ~55% in 2018. This was followed by Residential and Agriculture categories at 34% and 6%, respectively (see Figure 5).

Within the Fuel Combustion sub-sector, emissions from Liquid Petroleum Fuels were the major contributor, with an average share of ~57%, across the reference period. This was followed by emissions from Other Fuels and Gaseous Petroleum Fuels with average shares of ~28% and ~12%, respectively. Emissions from Coal were quite low with an average share of ~3% (see Figure 6).

Figure 5: Category-wise Emissions (Mt CO_2e) and Share Percentage in Total Energy Sector Emissions (2018)
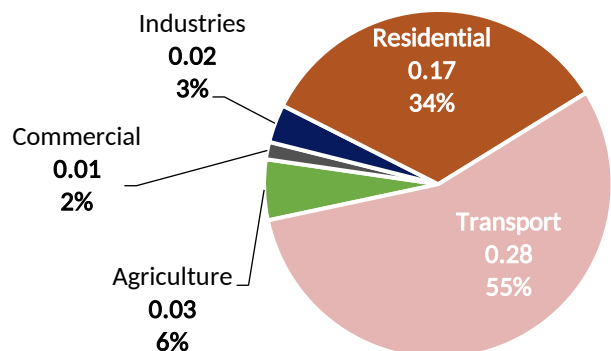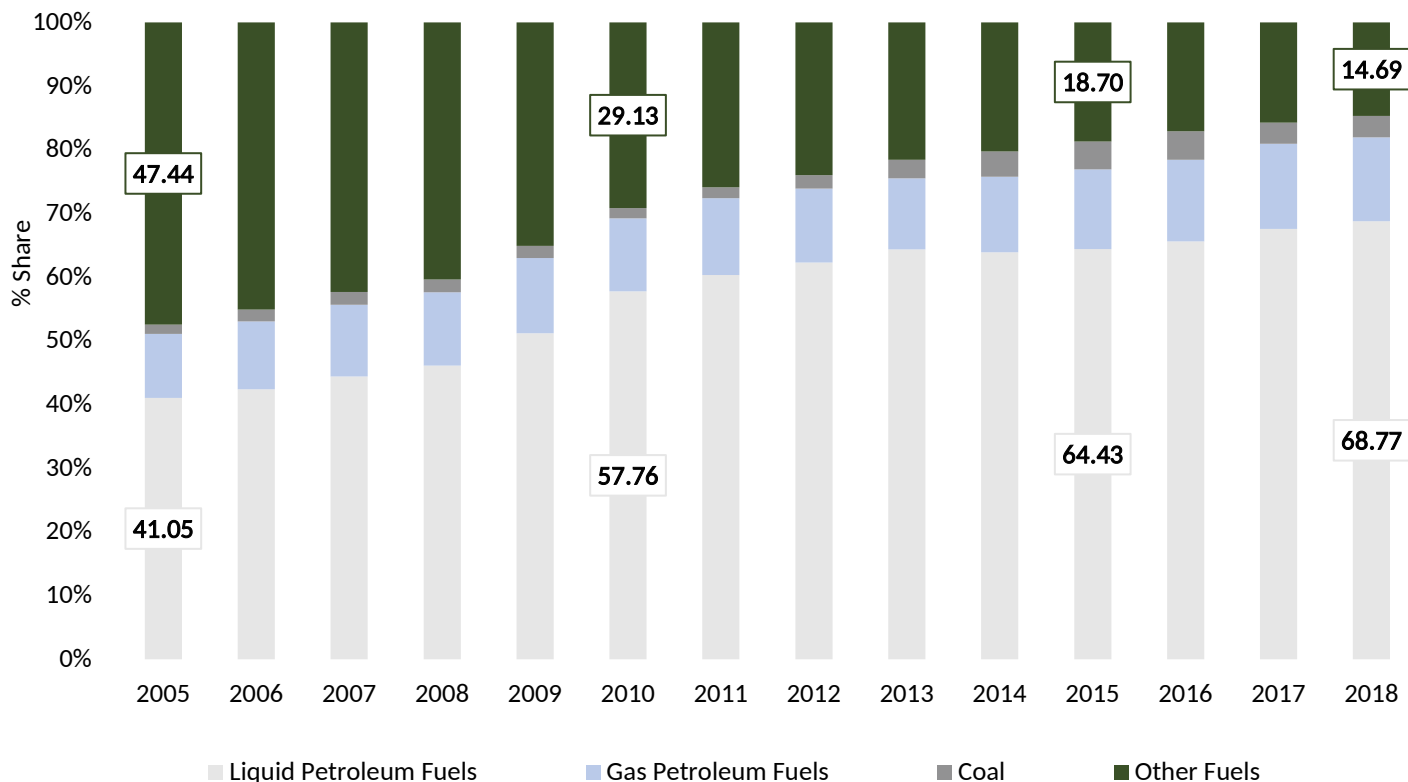
Figure 6: Percentage Share of GHG Emissions by Fuel Type due to Fuel Combustion in Energy Sector (2005 to 2018)*


*Notes

1. Coke is considered 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
4. Other Fuels comprise 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. Nagaland registered negligible emissions from the IPPU sector. Emissions emanated only from the sub-sector of Non-Energy Products from Fuels and Solvent Use. Within this sub-sector, the Lubricant Use was the only emitter. Emissions from the category of Lubricant Use increased at a CAGR of 10.62% from 0.86 t CO_2e in 2005 to 3.21 t CO_2e in 2018 (see Figure 14) with several ups and downs across the reference period.

Figure 14: GHG Emissions Estimates of IPPU Sector- Nagaland (2005 to 2018)
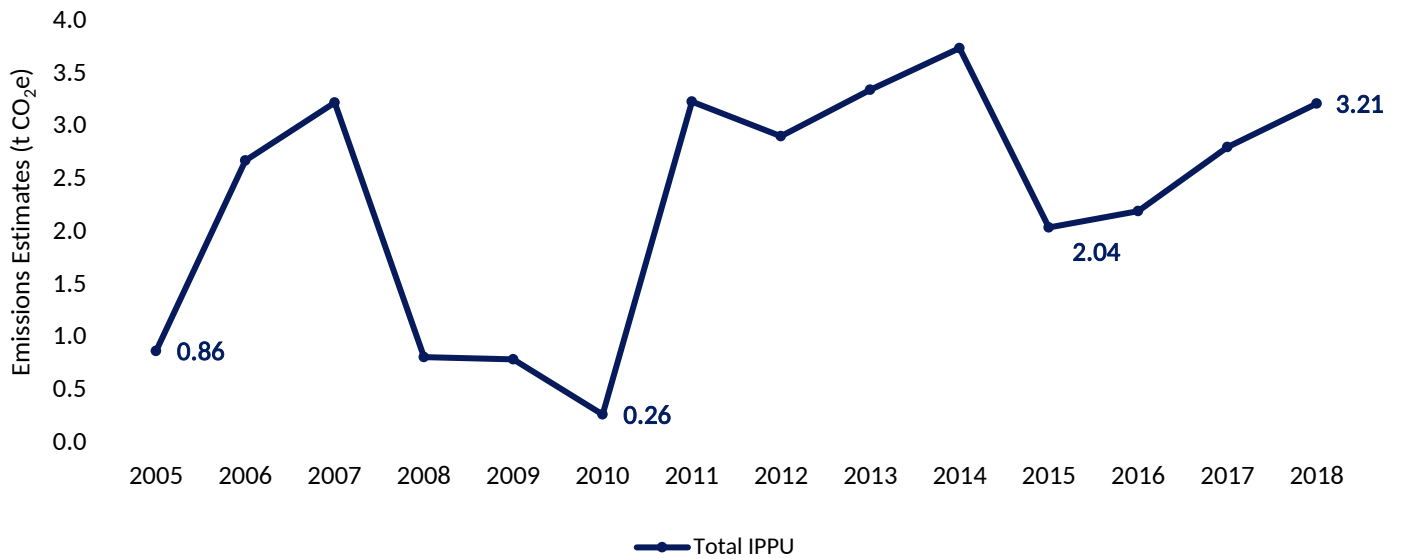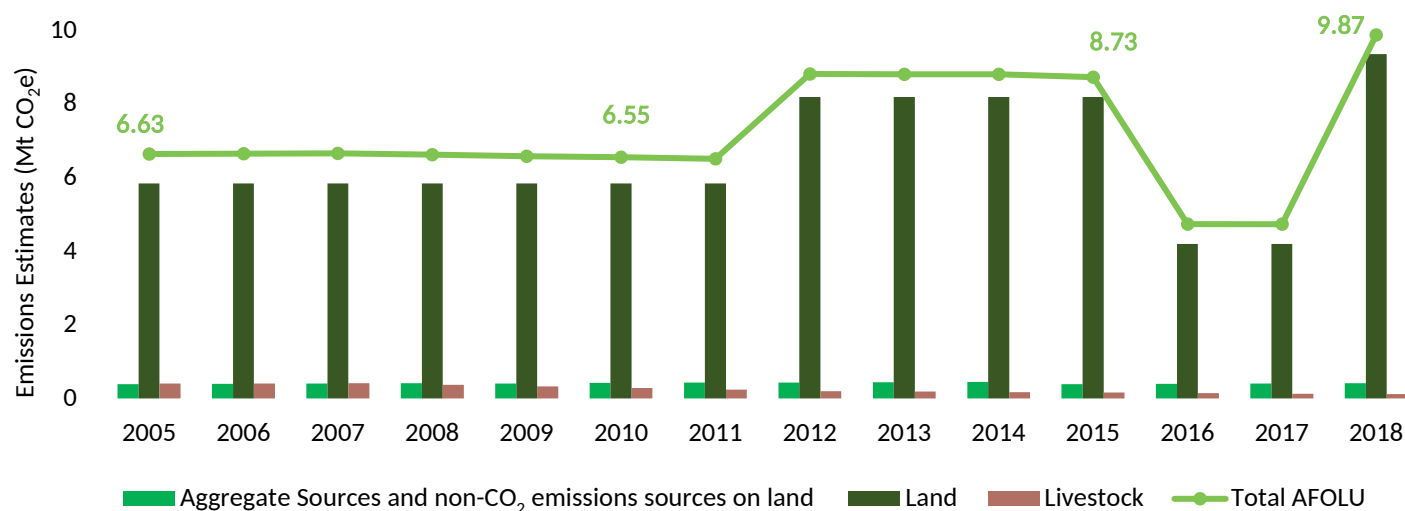
AFOLU Sector

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_2 Emission Sources on Land*. In Nagaland, the emissions from AFOLU sector represented ~94% of the total emissions in 2018.

The Land sub-sector was observed to be the major emitter of GHG emissions across the reference years as illustrated in Figure 7. This can be attributed to reduction in Nagaland's Forest area. The increase in emissions post 2011 can be attributed to land use and land use change trends and practices, especially in Grasslands category. The decline in emissions from the Land sub-sector in 2016 and 2017 can be attributed to relatively smaller reduction in forest area of the state in comparison to 2015. However, the emissions from this sub-sector increased significantly in 2018 due a relatively larger reduction in the forest area as reported by FSI (2021)**. Overall, the AFOLU sector emissions grew at a CAGR of 3.11% from 6.63 Mt CO_2e in 2005 to 9.87 Mt CO_2e in 2018.

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


In 2018, the highest contribution of emissions in the AFOLU sector was from Forest Land category (~53%). This was followed by Other land (35%) and Agriculture Land (7%) (see Figure 8).

From the Aggregate Sources sub-sector, Rice Cultivation was the major contributor to total AFOLU emissions with an average share of 4.69% across the reference period. The emissions from this category increased at a rate of 2.47% (compounded annually) from 0.27 Mt CO_2e in 2005 to 0.37 Mt CO_2e in 2018.

Within the Livestock sub-sector, the category of Enteric Fermentation was the major contributor to the total AFOLU emissions with an average share of ~2.88% across the reference period and decreased at a CAGR of 10.45% from 0.32 Mt CO_2e in 2005 to 0.08 Mt CO_2e in 2018 (see Figures 9).

Figure 8: Category-wise Emissions (Mt CO₂e) and Percentage Share in Total AFOLU Emissions (2018)
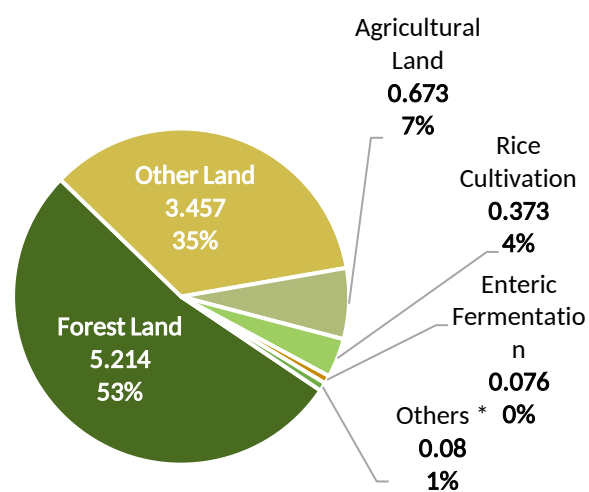
The sub-sector called 'Aggregate Sources and Non-CO₂ Emission Sources on Land' includes emissions from Rice Cultivation, Agriculture Soils and Biomass Burning in Cropland and Forestland.
*** FSI Report 2021 reports data for 2019*

Figure 9: Category-wise Percentage Share in Total AFOLU Emissions (2005-2018)*
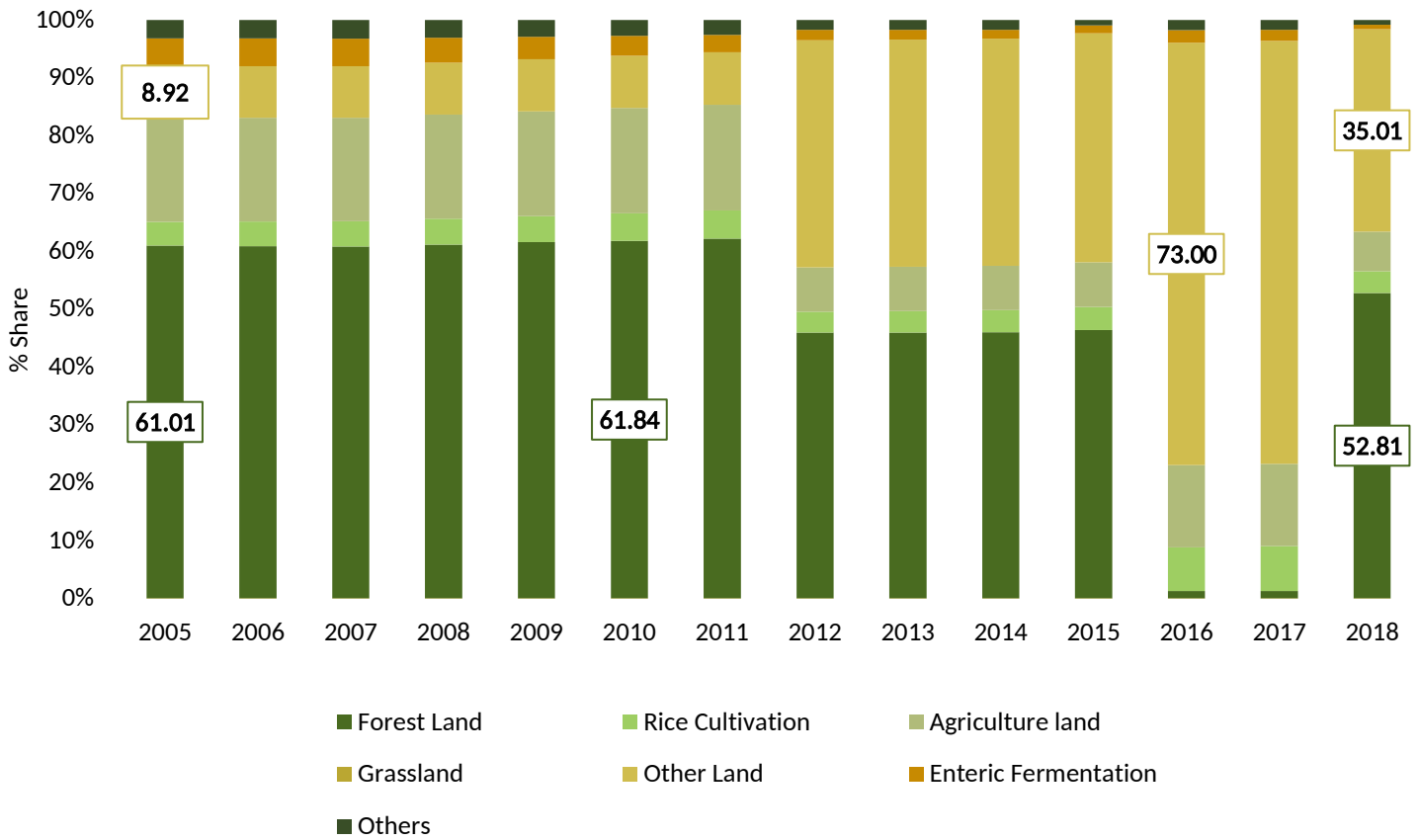
*Others include Agriculture Soils, Biomass Burning in both Cropland and Forest Land, Settlements and Manure management (for Figure 8 and 9).

Waste Sector

Solid Waste Disposal, Domestic Wastewater and Industrial Wastewater are the key sources of GHG emissions in the Waste sector. The Waste sector emissions were ~1% of Nagaland's total emissions in 2018. As illustrated in Figure 10, the Waste sector emissions grew at a CAGR of 1.85% from 0.11 Mt CO_2e in 2005 up from 0.14 Mt CO_2e in 2018. 2015 saw a jump in emissions due to a sudden increase in emissions from Domestic Wastewater sub-sector.

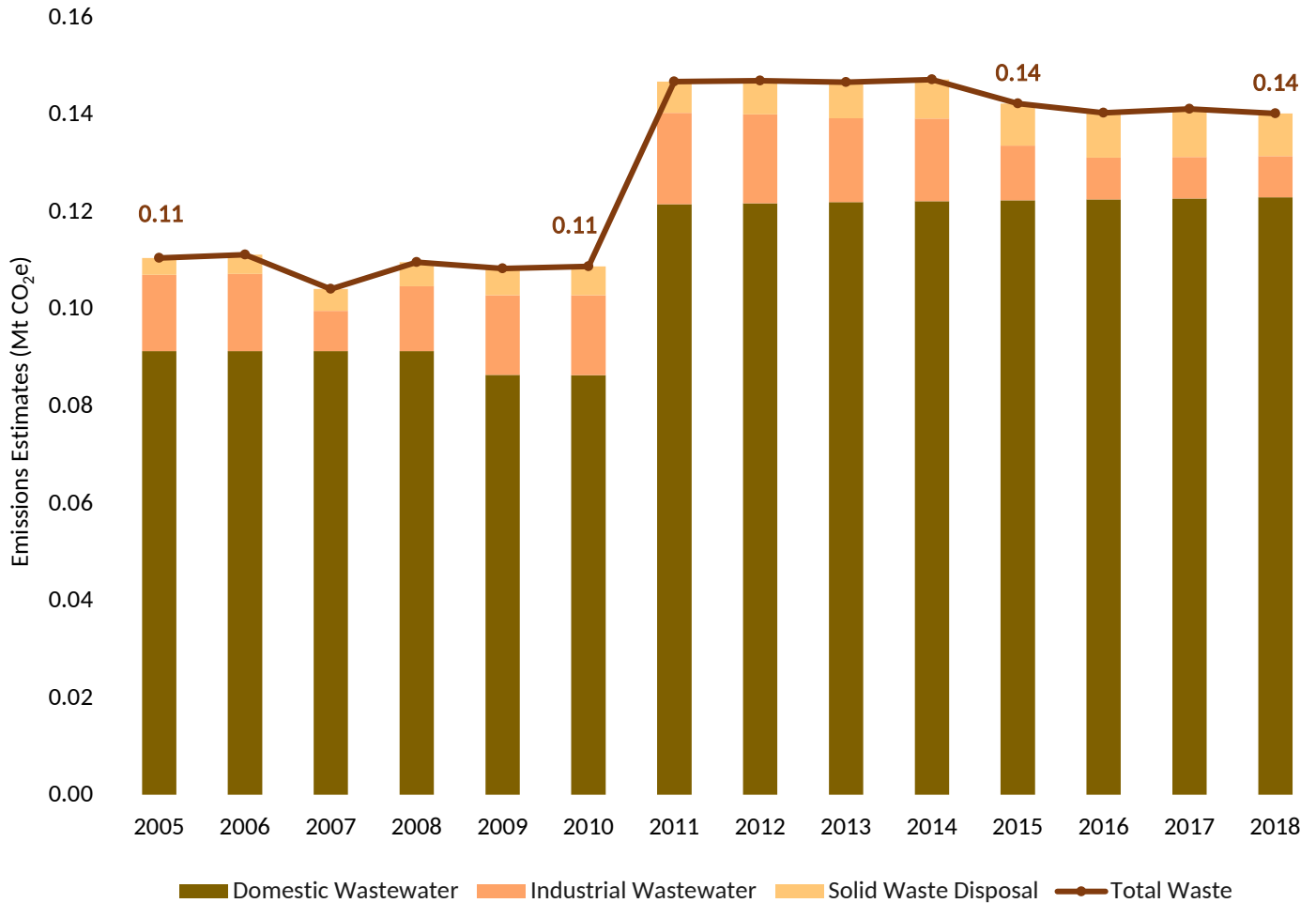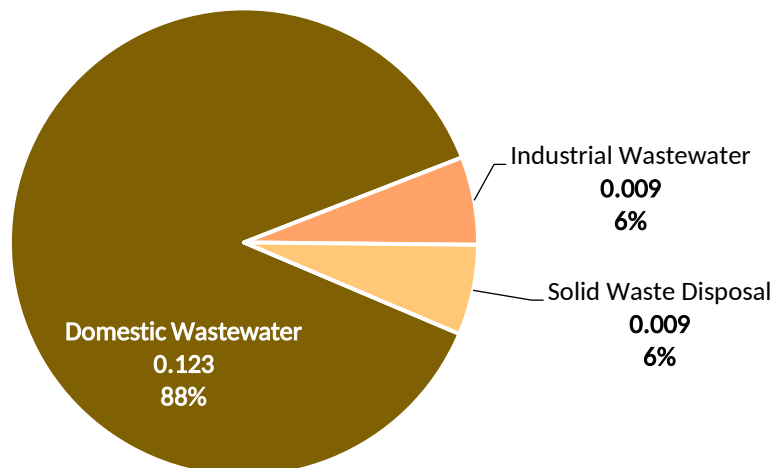**Figure 10: GHG Emissions Estimates of Waste Sector- Nagaland (2005 to 2018)**

Figure 11: Sub-sector Emissions (Mt CO_2e) 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 contributed ~88% of the total Waste sector emissions in Nagaland in 2018. Industrial Wastewater and Solid Waste Disposal each accounted for about 6% of the total emissions from the Waste sector (as shown in Figure 11). The emissions from Solid Waste Disposal grew at an estimated CAGR of ~7.42% from 0.003 Mt CO_2e in 2005 to 0.009 Mt CO_2e in 2018. Whereas, the emissions from Industrial Wastewater declined at a rate of ~4.60 % (compounded annually) from 0.016 Mt CO_2e in 2005 to 0.009 Mt CO_2e in 2018.

The Domestic Wastewater emissions increased at a CAGR of 2.31% from 0.09 Mt CO_2e in 2005 to 0.12 Mt CO_2e in 2018. Almost 59% of Domestic Wastewater emissions arose from rural areas of Nagaland in 2018 (as shown in Figure 12).

Figure 12: Area-wise GHG Emissions Estimates for Domestic Wastewater (2005 to 2018)
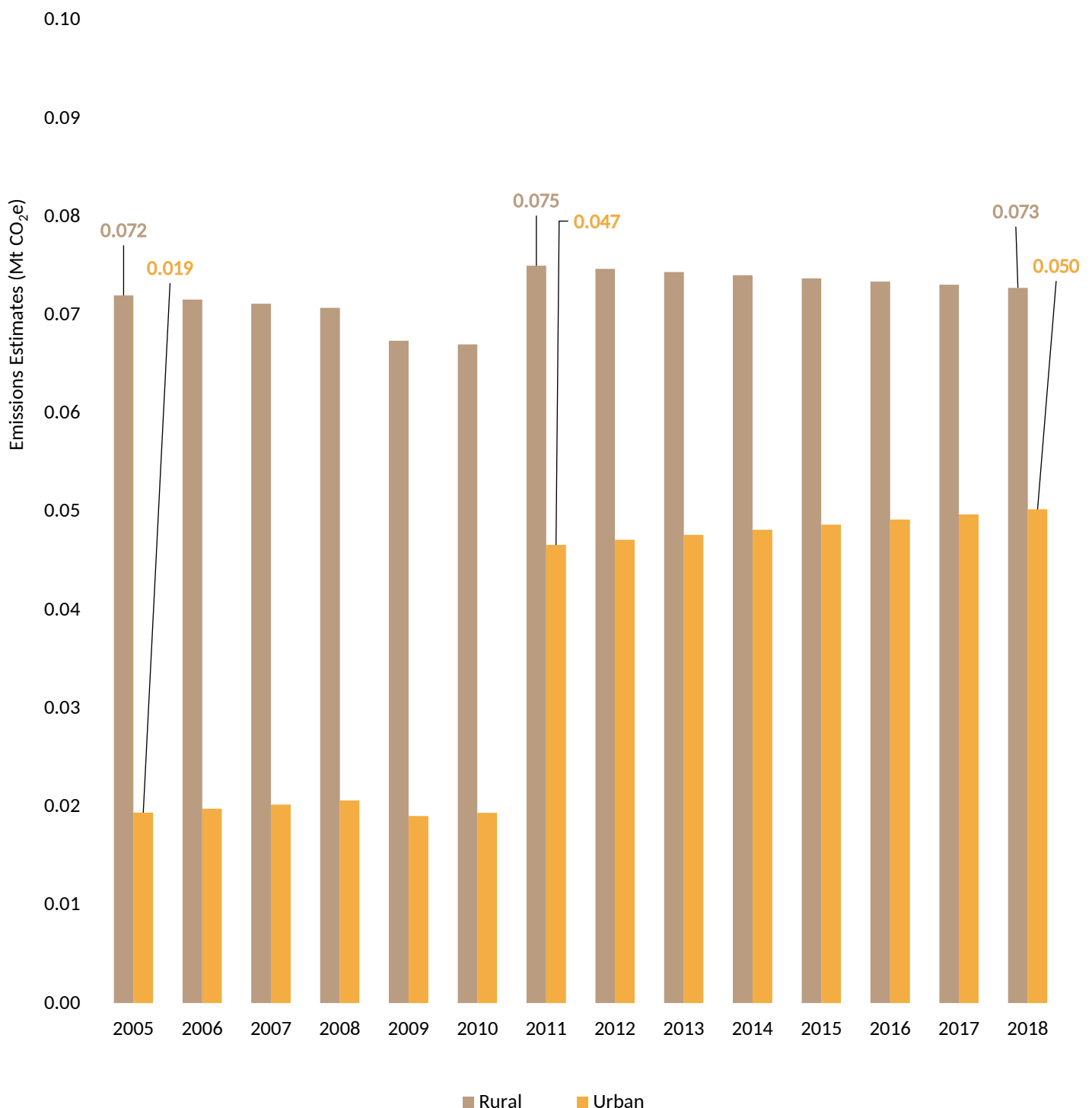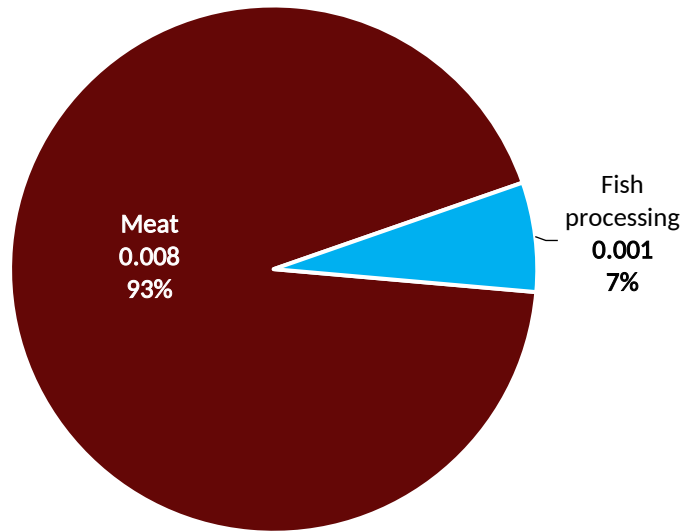
Figure 13 below shows that the Meat Industry was the major contributor to the Industrial Wastewater emissions with a share of 93% in 2018. This was followed by Fish Processing with a share of 7%.

Figure 13: Category-wise Emissions (Mt CO_2e) and Percentage Share in Total Industrial Wastewater Emissions (2018)

Meat
0.008
93%

Fish processing
0.001
7%

GHG Platform INDIA

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.