

Trend Analysis of GHG Emissions in ASSAM

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, Industrial Processes and Product Use (IPPU), Agriculture, Forestry & Other Land Use (AFOLU) and Waste.

The Platform seeks to add value to the various ongoing GHG emission 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*



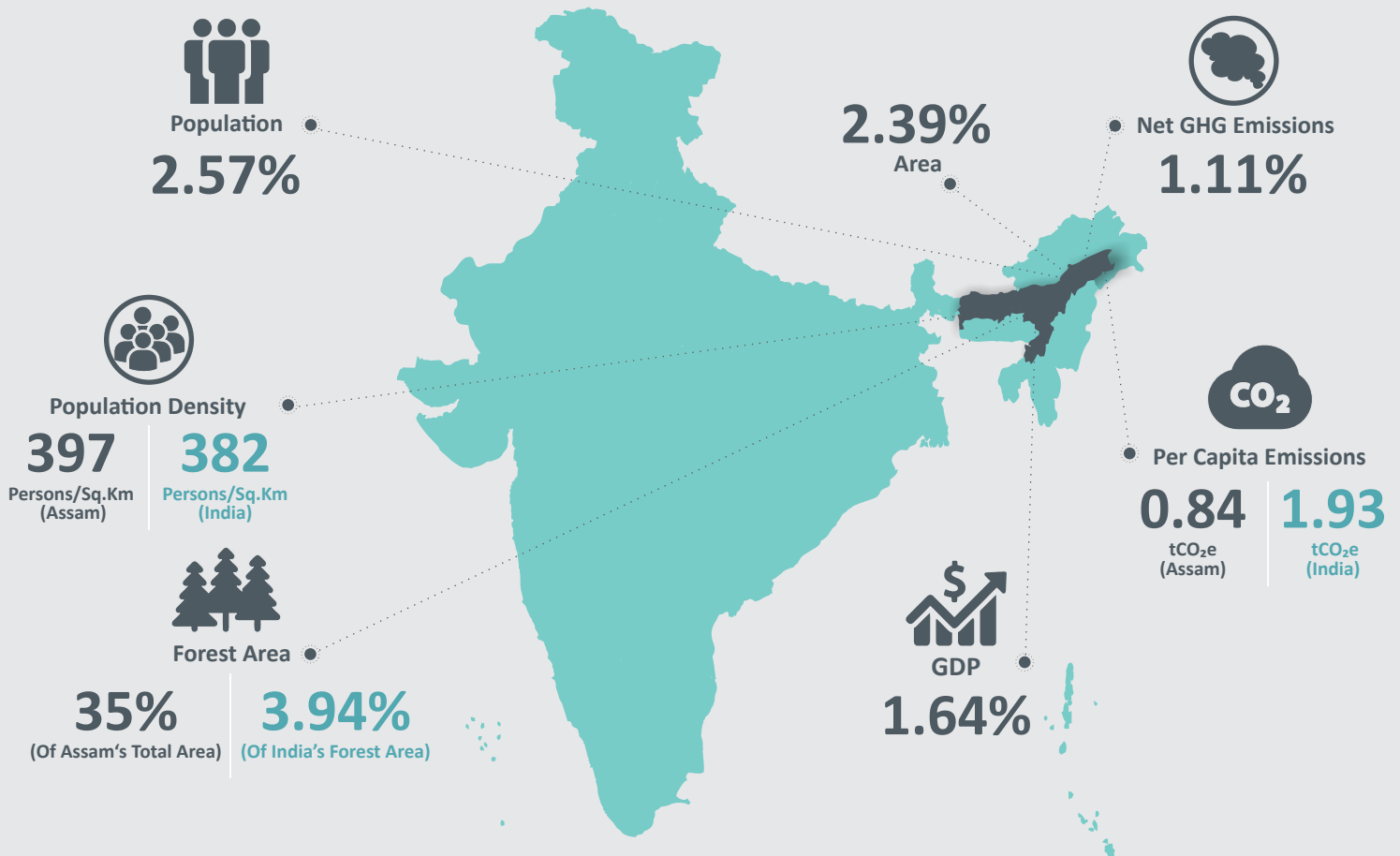
AFOLU



WASTE

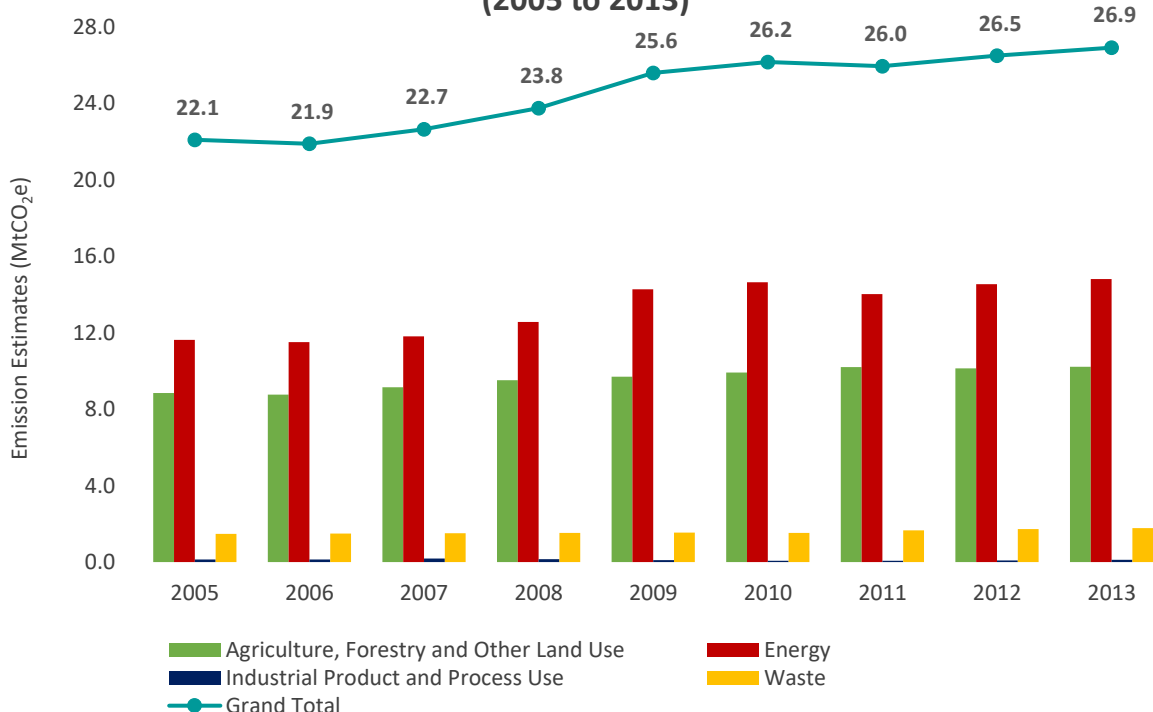
*Fuel combusted for Captive Electricity Generation (Auto-Producers) has been reported under Energy sector.

Assam at a glance (2013)



Economy-wide Emission Estimates

Figure 1: GHG Emission Estimates for Assam (2005 to 2013)



Emissions of Assam grew at an estimated CAGR¹ of 2.50% from 22.1 MtCO₂e in 2005 to 26.9 MtCO₂e in 2013² as depicted in Figure 1 above. The Energy and AFOLU sectors formed the major share of emissions with ~93% contribution to the total emissions of Assam in 2013. Bulk of the remaining ~7% emissions registered in 2013 emanated from the Waste sector with a negligible contribution from the IPPU sector (~0.4%). The sectoral shares remained stable from 2005 levels showing a flat growth of emissions.

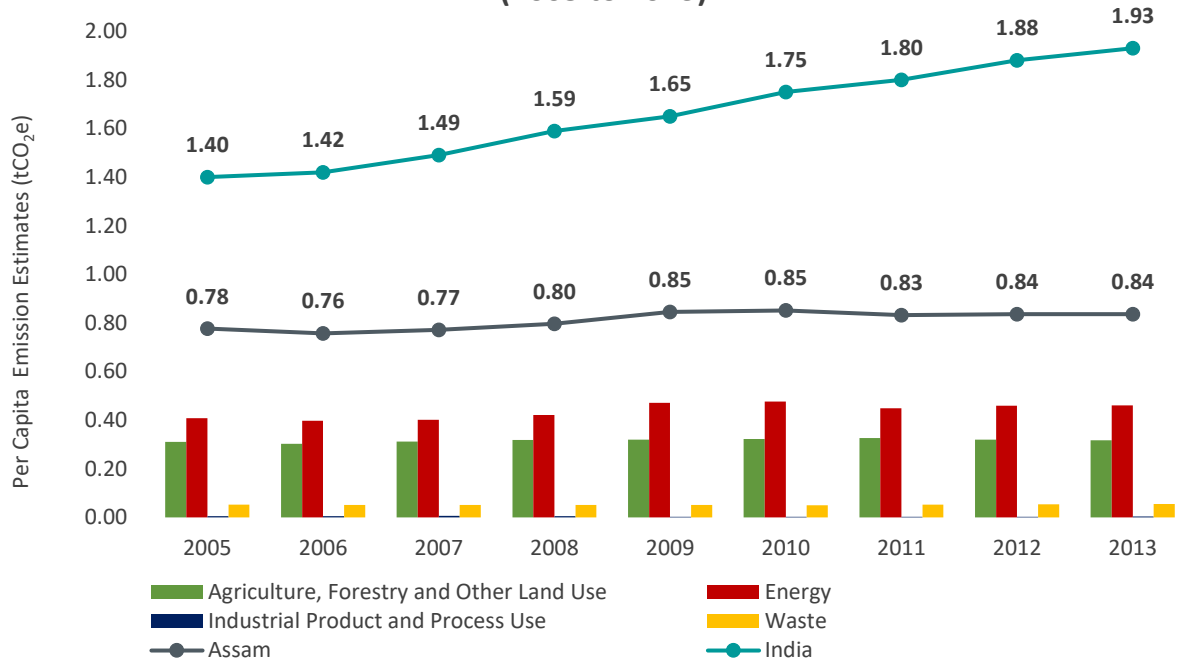
Figure 2: Sector-wise Contribution to Economy-wide GHG Emissions of Assam



¹ Compound Annual Growth Rate

² Calendar year values have been considered for this analysis. For Global Warming Potential (GWP) calculations IPCC-ARII values have been considered.

Figure 3: Per capita GHG Emissions for Assam and India (2005 to 2013)

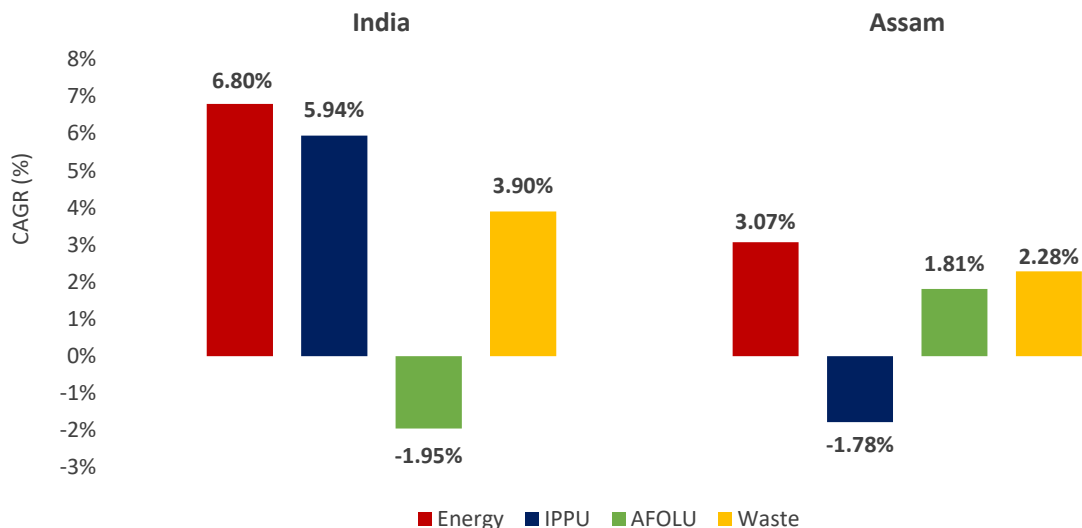


Assam recorded per capita emissions of 0.84 tCO₂e in 2013, slightly higher than its value in 2005 (0.78 tCO₂e). When compared to India, per capita emissions of Assam were much lower than that of the country across all the years in consideration as illustrated in the Figure 3 above. The per capita emissions of Assam grew at a low CAGR of 0.94% while that of India rose at a rate of 4.07% (compounded annually) from 2005 to 2013.

GHG emissions from the Energy sector of Assam recorded the highest growth rate of 3.07% from 2005 to 2013 amongst all other sectors. This was followed by the Waste and AFOLU sectors which recorded a lower growth rate of 2.28% and 1.81% respectively. The IPPU sector registered a negative growth and declined at a compounded rate of 1.78% as illustrated in Figure 4.

Figure 4: Sector-wise GHG Emissions Growth Rate from 2005 to 2013

These growth rates have been compounded annually.

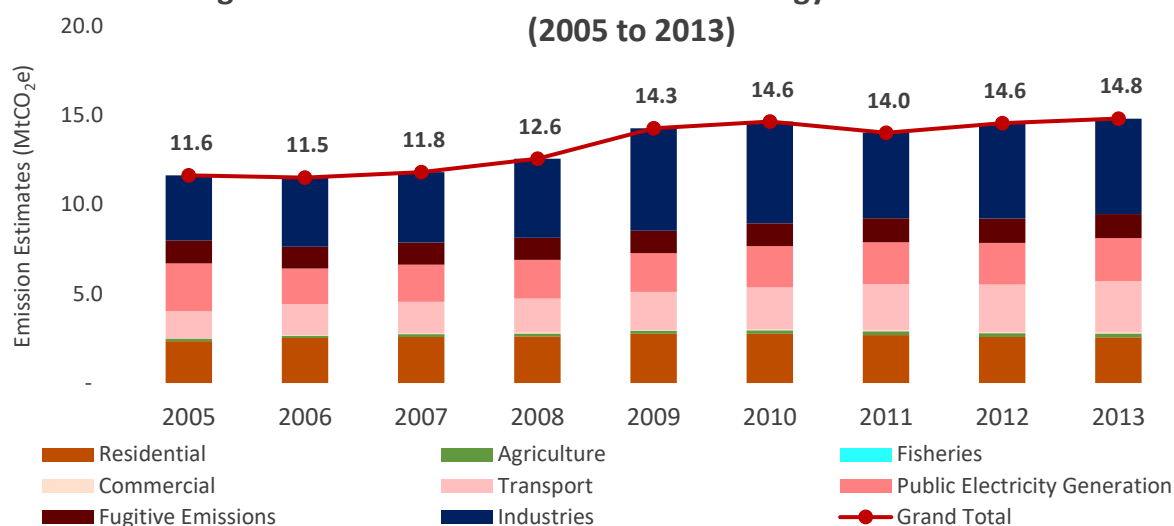




Energy Sector

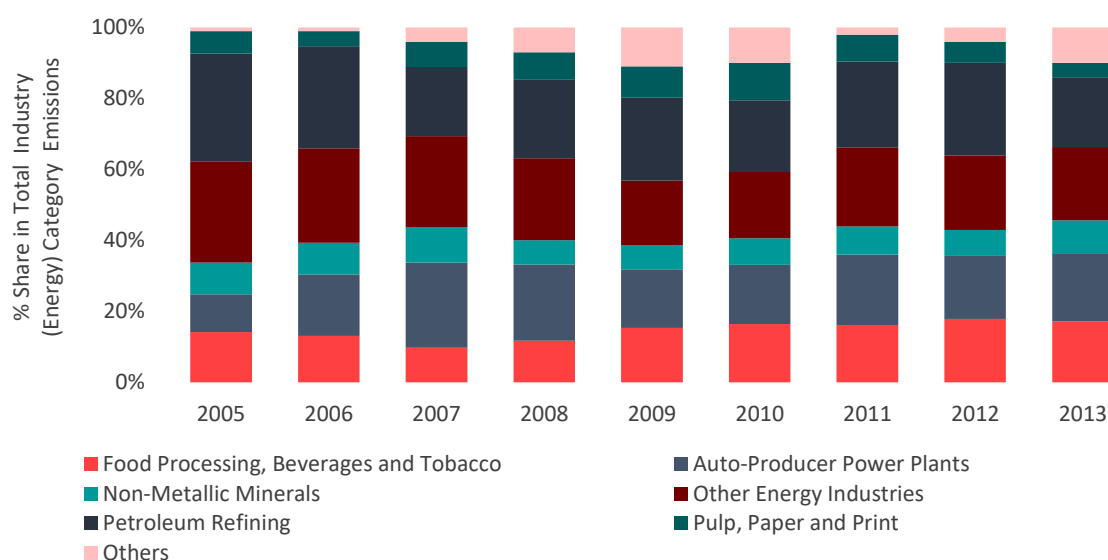
The Energy sector represented ~55% of the total emissions of Assam in 2013. In general, emissions from Energy sector arise from two main sub-sectors – Fuel Combustion (Public Electricity Generation, Transport, Industries and Agriculture, Commercial and Residential categories) and Fugitive. ~91% of the Energy sector emissions arose from Fuel Combustion sub-sector, while the remaining ~9% emissions were from Fugitive sub-sector in 2013. Emissions from the Energy sector grew at an estimated CAGR of 3.07% from 11.6 MtCO₂e in 2005 to 14.8 MtCO₂e in 2013 (Figure 5).

Figure 5: GHG Emission Estimates for Energy Sector in Assam (2005 to 2013)



Deep diving into various Energy categories, it was observed that Industries category was the major contributor of GHG emissions across all the years with an average share of ~35% in the total emissions of this sector. Emissions from the Industries category grew at a CAGR of 4.93% from 3.6 MtCO₂e in 2005 to 5.3 MtCO₂e in 2013. Amongst the various Industries, Petroleum Refining was the major emitter of GHGs till the year 2012 with a share of ~26% in total Fuel Combusted from Industrial emissions. However, during the reference period, the share of Petroleum Refining Industry gradually decreased, and emissions from Other Energy Industries (diesel consumption in coal mining activity) gradually increased to become the major contributor of emissions with a share of ~21% in 2013. In the same year, emissions from Petroleum Refining and Auto-Producer Power Plants contributed to ~20% and ~19% of total energy use emissions from Industrial category in the state (Figure 6).

Figure 6: Share of GHG Emissions from Industries (Energy) Category (2005 to 2013)

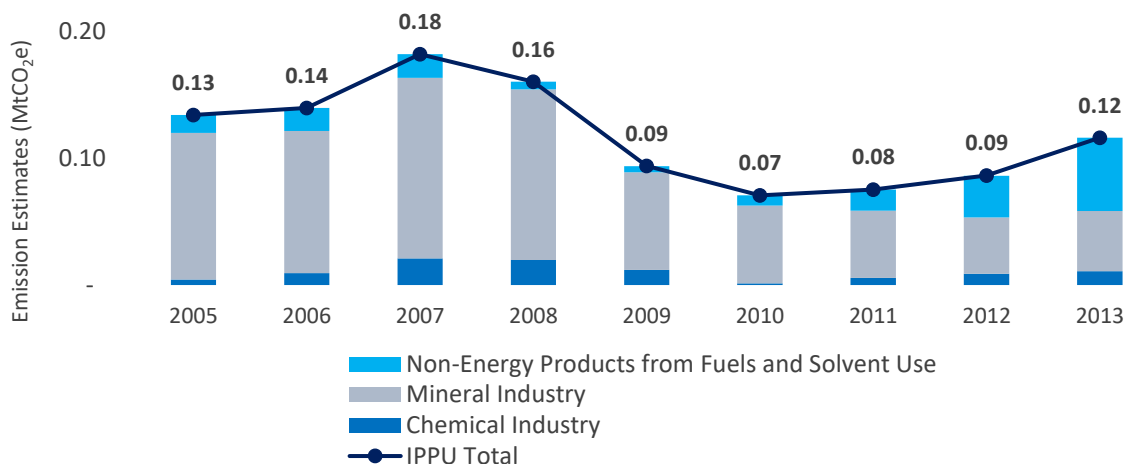




IPPU Sector

The IPPU sector represented ~0.4% of the total emissions of Assam in 2013. Emissions from the IPPU sector in the state are largely driven by Chemical, Mineral Industries and Non-Energy Products from Fuels and Solvent use. Between 2005 and 2013, the overall IPPU emissions declined at a rate of 1.78% (compounded annually) from 0.13 MtCO₂e in 2005 to 0.12 MtCO₂e in 2013 as depicted in Figure 7 below.

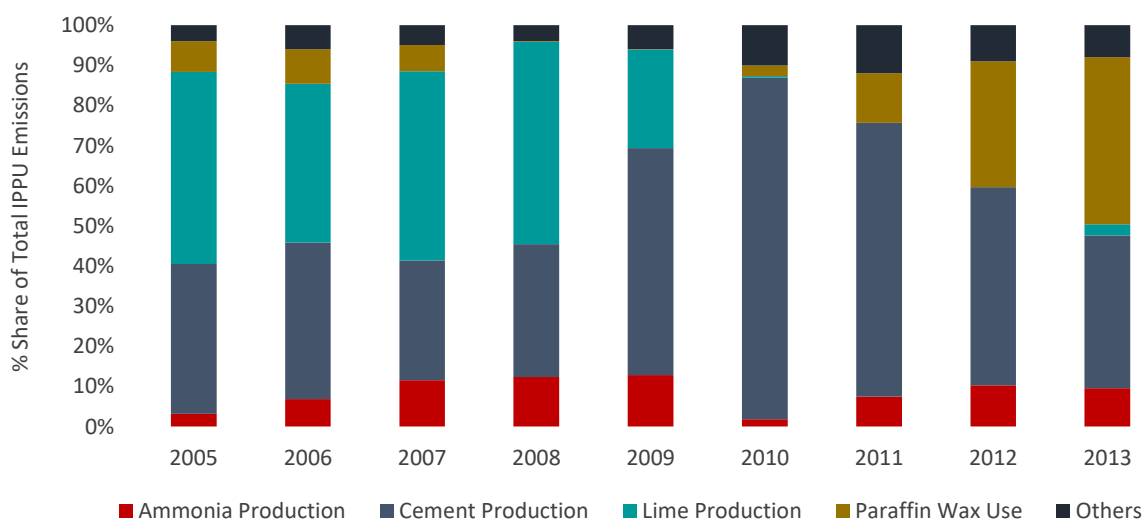
Figure 7: GHG Emission Estimates from IPPU Sector in Assam (2005 to 2013)



An interim rise in 2007 and a subsequent dip in 2009 was observed in the total emissions of the IPPU sector owing to variations in the Industrial activity in the state. During the initial years, Mineral Industries were the major contributor of GHG emissions which then declined with a rate of 10.54% (compounded annually) from 0.12 MtCO₂e in 2005 to 0.05 MtCO₂e in 2013. However, emissions from Non-Energy Products (Solvents and Paraffin) increased during the later years and was the major contributor to IPPU emissions in 2013.

Disaggregating the emissions at a sub-sectoral level (Figure 8) reveals Mineral Industry in the state comprised of Lime and Cement Production. Until 2008, Lime Production was the key driver of emissions but, from 2009 to onwards Cement Production emerged as the major emitter of GHGs in the IPPU sector till 2012. In 2013, maximum emissions arose due to the usage of Paraffin Wax (~42%) followed by Cement Production (~38%) and Ammonia Production (~10%).

Figure 8: Share of GHG Emissions for IPPU Categories (2005 to 2013)

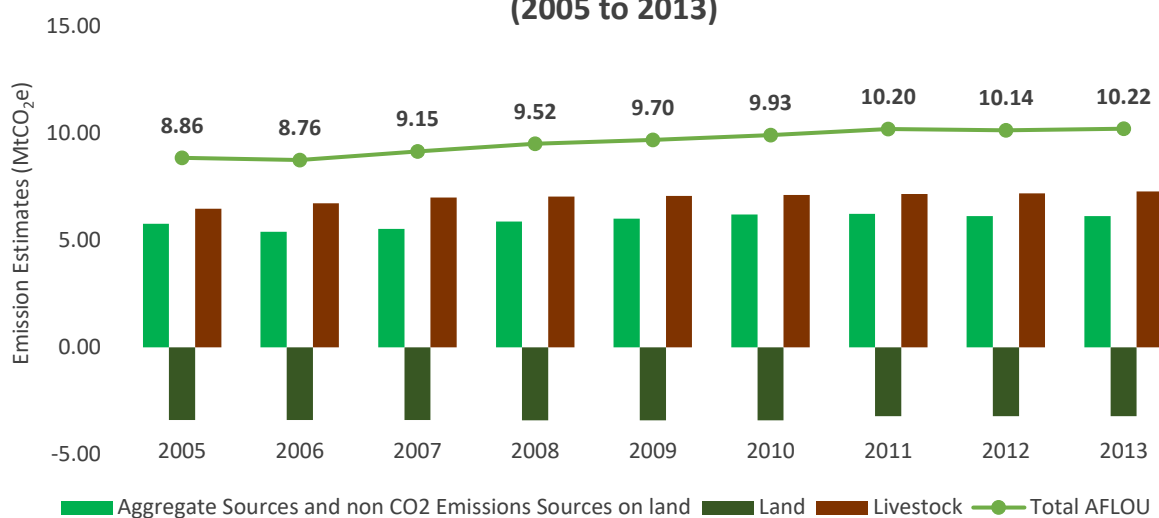




AFOLU Sector

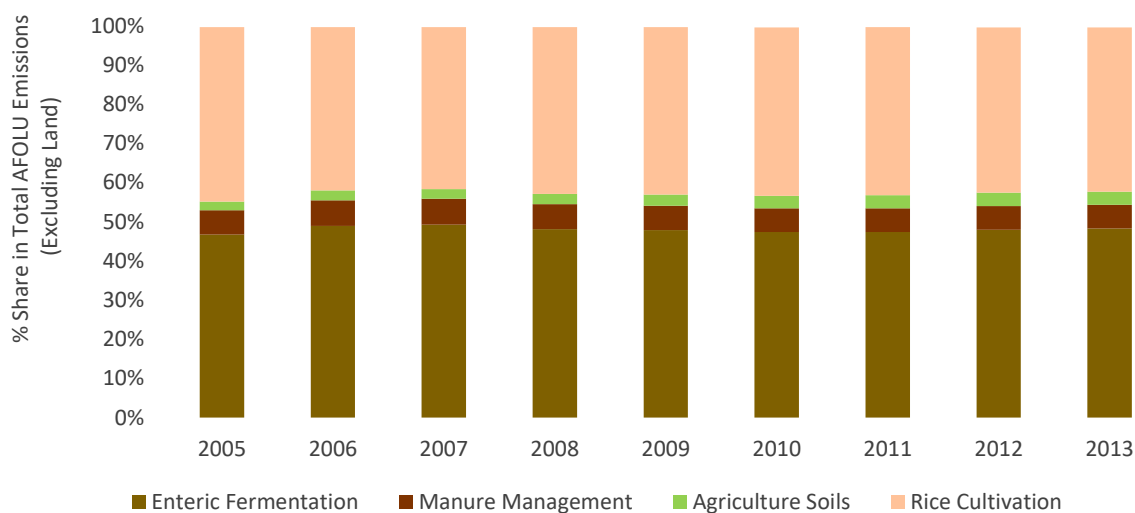
The AFOLU sector represented ~38% of the total emissions in Assam in 2013. Emissions from the AFOLU sector arise from three main sub-sectors namely Livestock, Land and Aggregate Sources and Non-CO₂ Emissions Sources on Land. Emissions from this sector increased gradually at a CAGR of 1.81% from 8.86 MtCO₂e in 2005 to 10.22 MtCO₂e in 2013 as depicted in Figure 9 below. Notably, the Land sub-sector was a sink of GHGs in Assam from 2005 to 2013 and the removals from this sector remained nearly constant throughout the reference period.

Figure 9: GHG Emissions for AFOLU Sector in Assam (2005 to 2013)



On further investigation of the AFOLU sub-sectors, it was found that maximum emissions occurred due to Livestock sub-sector which grew at an estimated CAGR of 1.48% from 6.48 MtCO₂e in 2005 to 7.29 MtCO₂e in 2013. Under Livestock, majority of the emissions recorded were mainly from Enteric Fermentation throughout the reference period with an average share of ~48% in the total AFOLU emissions (excluding Land). Rice Cultivation remained the second most GHG emitting category of the AFOLU sector across all the years with an average share of ~43% as depicted in Figure 10 below.

Figure 10: Share of GHG Emissions for AFOLU Categories (Excluding Land) (2005 to 2013)





Waste Sector

The Waste sector contributed to ~7% of the total emissions in Assam in 2013. Municipal Solid Waste³, Domestic Wastewater and Industrial Wastewater are the key sources of GHG emissions in the Waste sector. GHG emissions from the Waste sector grew at an estimated CAGR of 2.28% from 1.48 MtCO₂e in 2005 to 1.77 MtCO₂e in 2013 as depicted in Figure 11 below. A slight spike in the overall emissions in 2011 can be attributed to higher Domestic wastewater emissions, which reflects changing trends in use of various treatment systems as reported in Census of India 2011

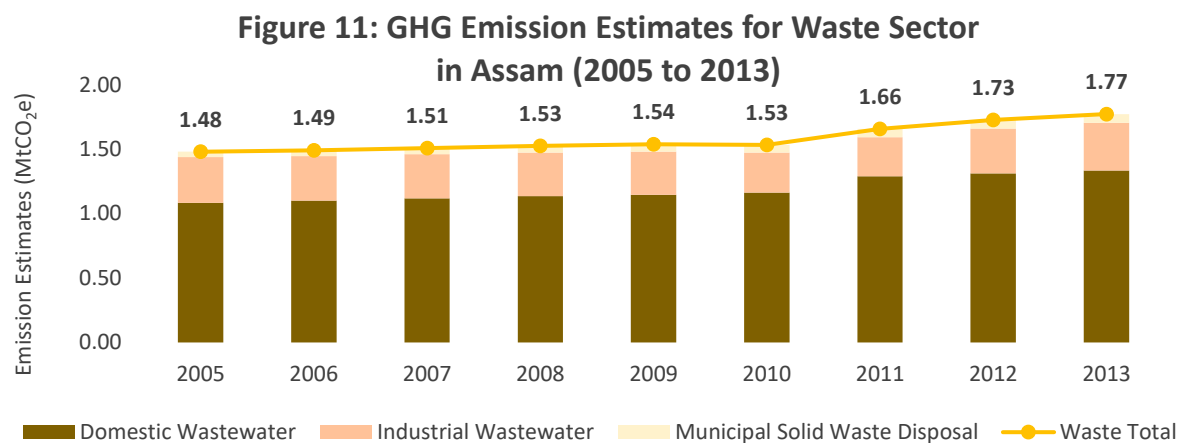
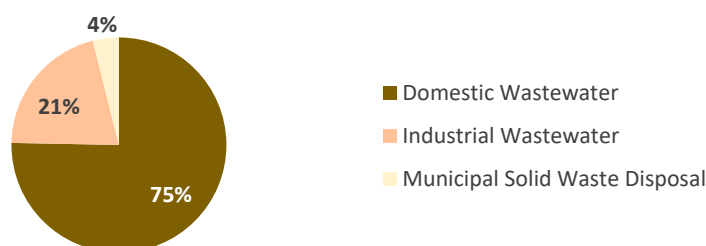


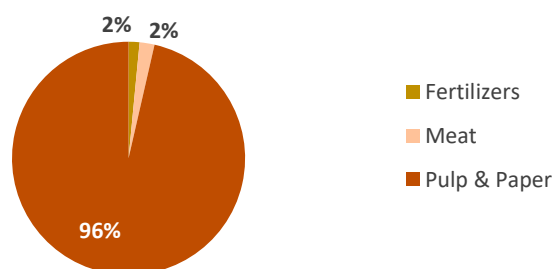
Figure 12: Category-wise Share of GHG Emissions for Waste Sector (in 2013)



Domestic Wastewater had a share of ~75% in the total emissions from the Waste sector of Assam in 2013 (Refer Figure 12). Emissions from this sub-sector grew at a CAGR of 2.63% from 1.08 MtCO₂e in 2005 to 1.33 MtCO₂e in 2013. It was observed that major contribution of emissions in this sub-sector was due to the Wastewater originating from rural areas of Assam (~79% in 2013) during the reference period. Notably, discharge of untreated wastewater and use of septic tanks are key drivers of emissions in this sub-sector.

Almost 21% of the total Waste sector emissions were due to Industrial Wastewater in 2013. The emissions from this sub-sector grew at a low rate of 0.46% (compounded annually) from 0.36 MtCO₂e in 2005 to 0.37 MtCO₂e in 2013. Pulp & Paper Industry was the top emitter in this sub-sector with a contribution of ~96% in 2013. The remaining ~4% emissions in the said year belonged to Meat (~2%) and Fertilizers (~2%) Waste respectively (Figure 13).

Figure 13: Share of GHG Emissions for Industrial Wastewater Categories (in 2013)



³ Refers to emission in urban areas. Emissions from Municipal Solid Waste Disposal in rural areas are not considered, as disposal predominantly occurs in a dispersed manner and does not generate significant CH₄ emissions'



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The Platform comprises of the following civil society:



An initiative supported by



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