GHG Platform INDIA

Trend Analysis of GHG Emissions in 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, namely- Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry & Other Land Use (AFOLU) and Waste.

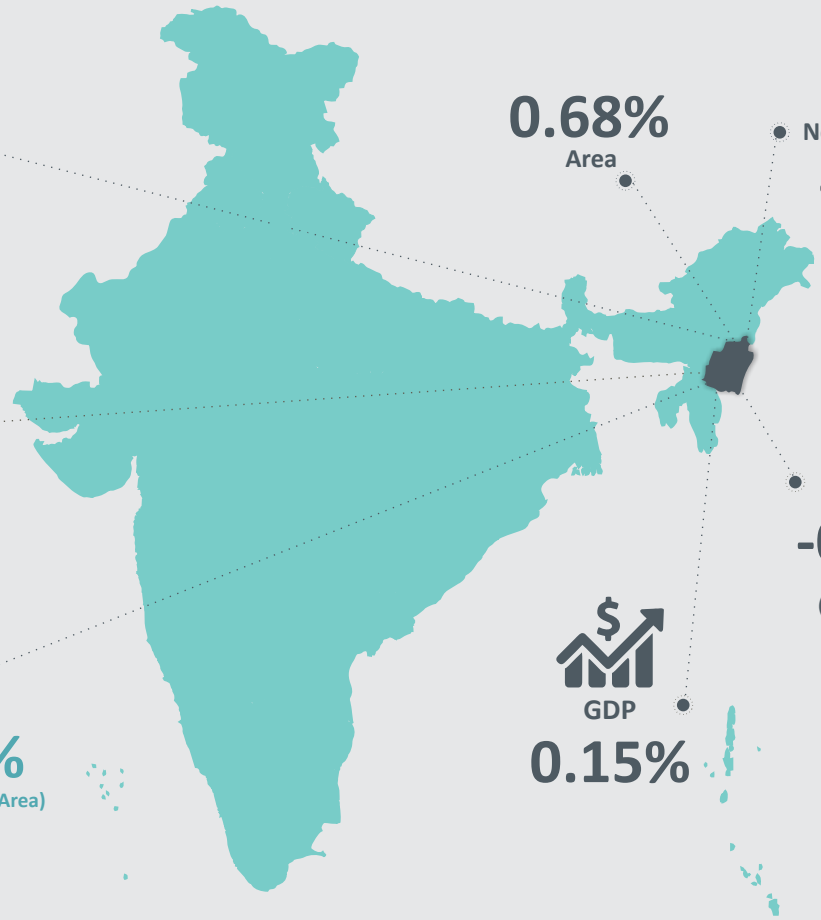
The Platform seeks to add value to the various ongoing GHG emission estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

Manipur at a glance (2013)



Population
0.24%

0.68%
Area

Net GHG Emissions
-0.03%

Population Density
122 Persons/Sq.Km (Manipur)
382 Persons/Sq.Km (India)

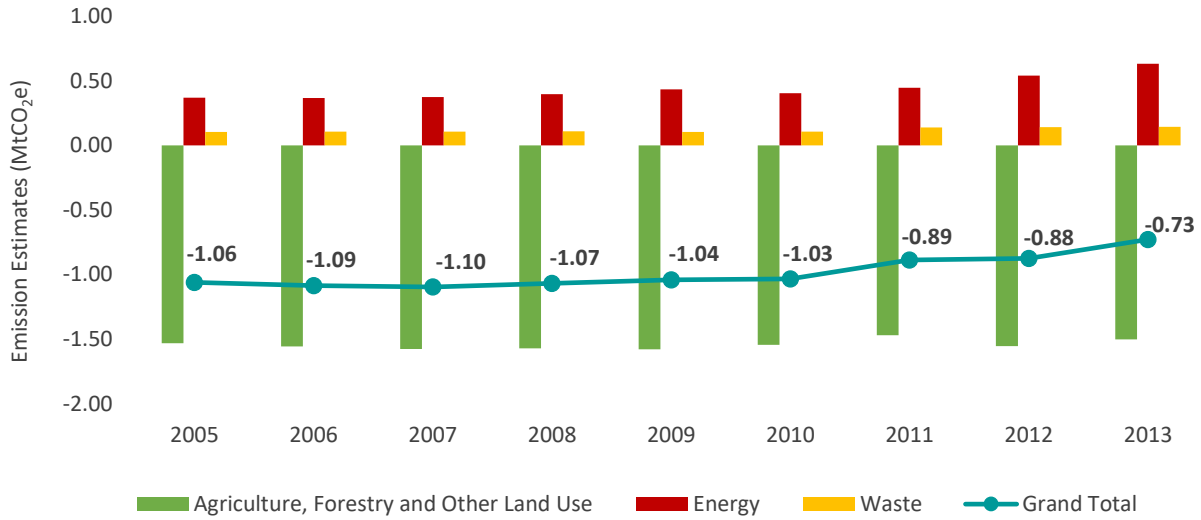
Per Capita Emissions
-0.24 tCO_2e (Manipur)
1.93 tCO_2e (India)

Forest Area
76% (Of Manipur's Total Area)
2.42% (Of India's Forest Area)

GDP
0.15%

Economy-wide Emission Estimates

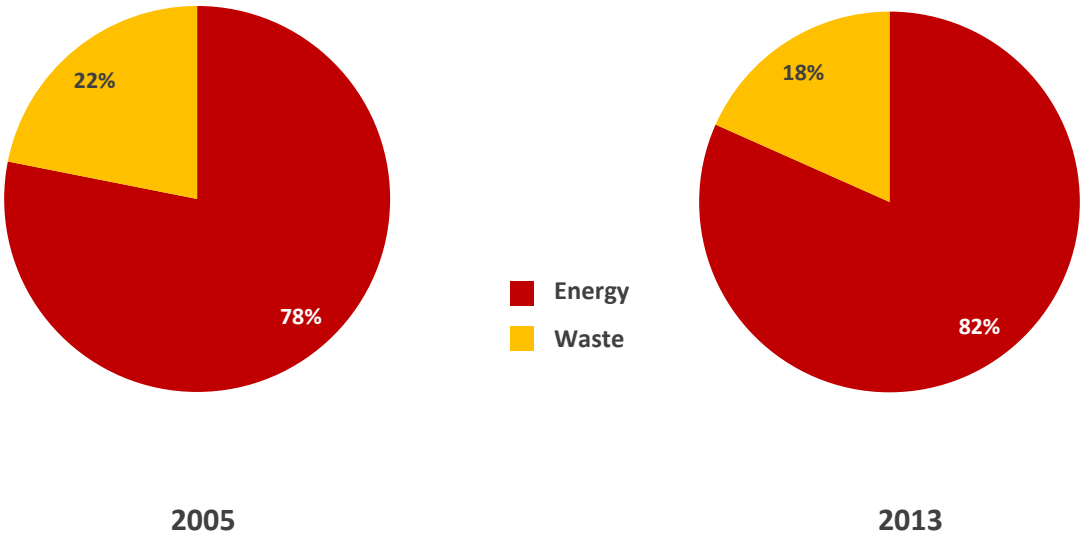
Figure 1: GHG Emission Estimates for Manipur (2005 to 2013)



Manipur was a net sink of GHGs from 2005 to 2013[1]. Removals from this state declined at a negative compound rate of 4.58% from 1.06 $MtCO_2e$ in 2005 to 0.73 $MtCO_2e$ GHGs in 2013. No emissions were registered from the IPPU sector of Manipur while notable emissions were recorded from the Energy and Waste sectors respectively. The AFOLU sector was a net remover of GHGs as depicted in Figure 1 above.

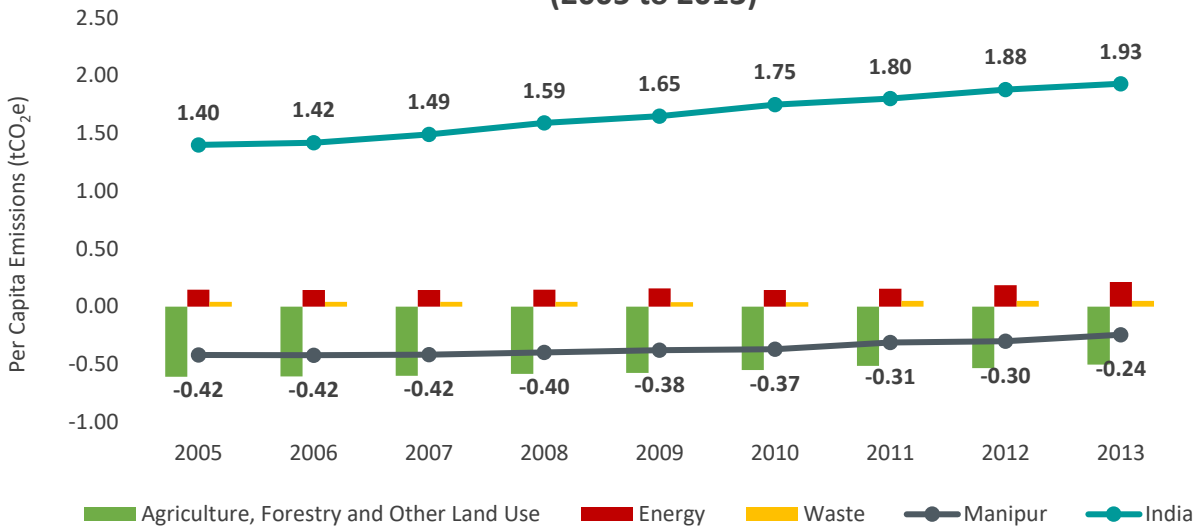
If net positive emissions were to be considered (i.e. without the AFOLU sector), ~78% emissions arose from the Energy sector and the remaining ~22% from the Waste sector in 2005 (Figure 2). The share of emissions from the Energy sector increased to ~82% In 2013, while the share of emissions from the Waste sector declined to ~18% in 2013.

Figure 2: Sector-wise Contribution to Economy-wide GHG Emissions (Excluding AFOLU sector) of Manipur



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

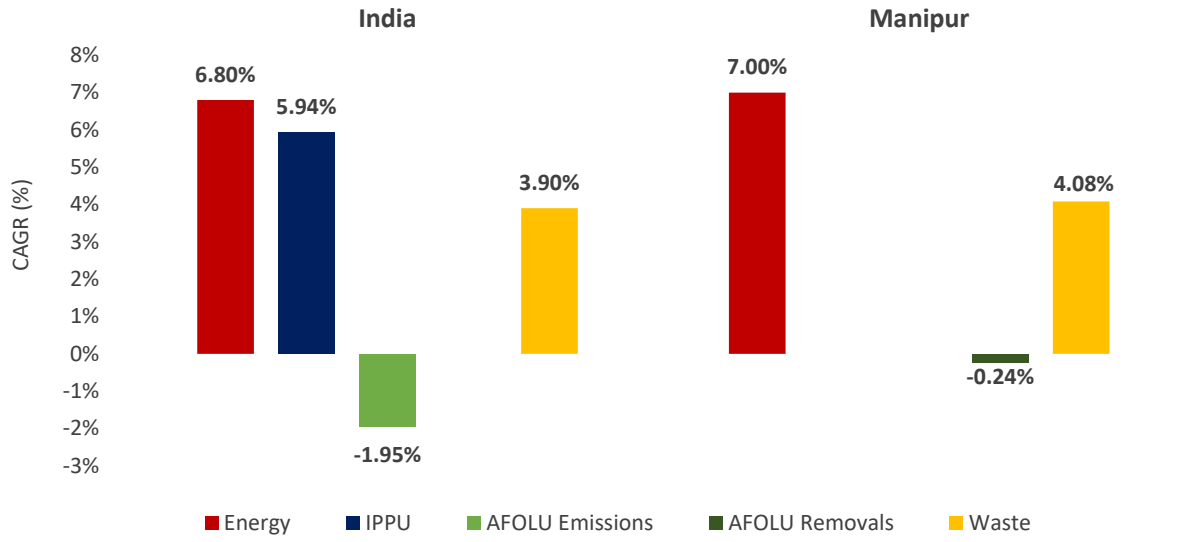
Figure 2: Per Capita GHG Emissions from Manipur and India (2005 to 2013)



Per Capita removals from Manipur declined from 0.42 tCO_2e in 2005 to 0.24 tCO_2e in 2013. When compared to per capita emissions of India which are a net positive, Manipur recorded per capita removals of GHGs. The growth rate of emissions for India from 2005 to 2013 was 4.07% (CAGR[2]) (Figure 3) while the rate of decline in per capita removals for Manipur was -6.46%. Thus, Manipur as a whole was a net sink of GHGs, unlike the rest of India.

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

These growth rates have been compounded annually.



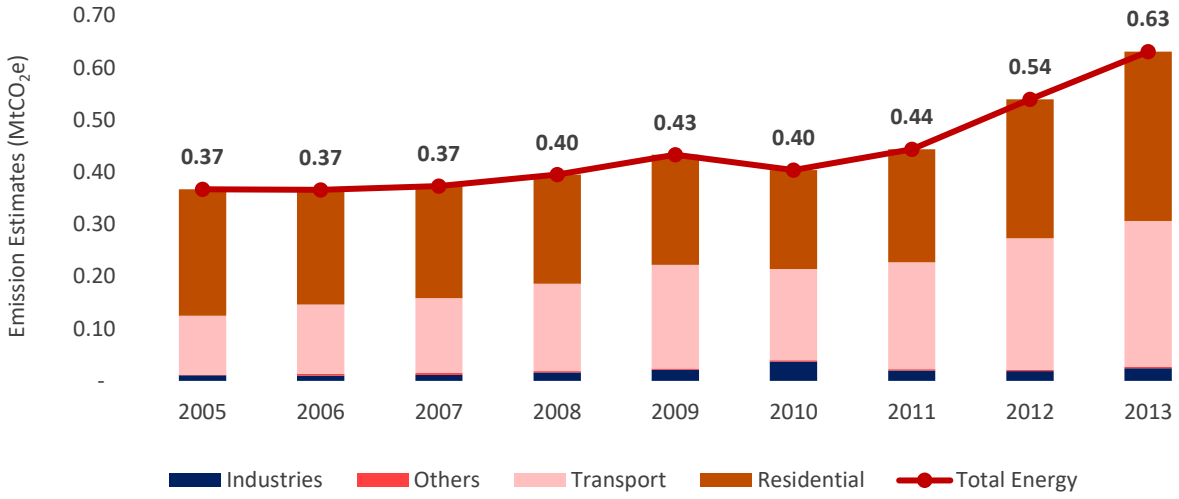
GHG emissions from the Energy sector of Manipur recorded the highest growth rate of 7% from 2005 to 2013 amongst all other sectors (Figure 4). This was followed by the Waste sector which recorded a 4.08% growth. The AFOLU sector registered a negative trend and the removals declined by 0.24%. When compared to India, Energy and Waste sectors of Manipur recorded a slightly higher rate of emissions while the AFOLU sector registered removals of GHGs, albeit at a declining rate.

[2] Compound Annual Growth Rate

Energy Sector

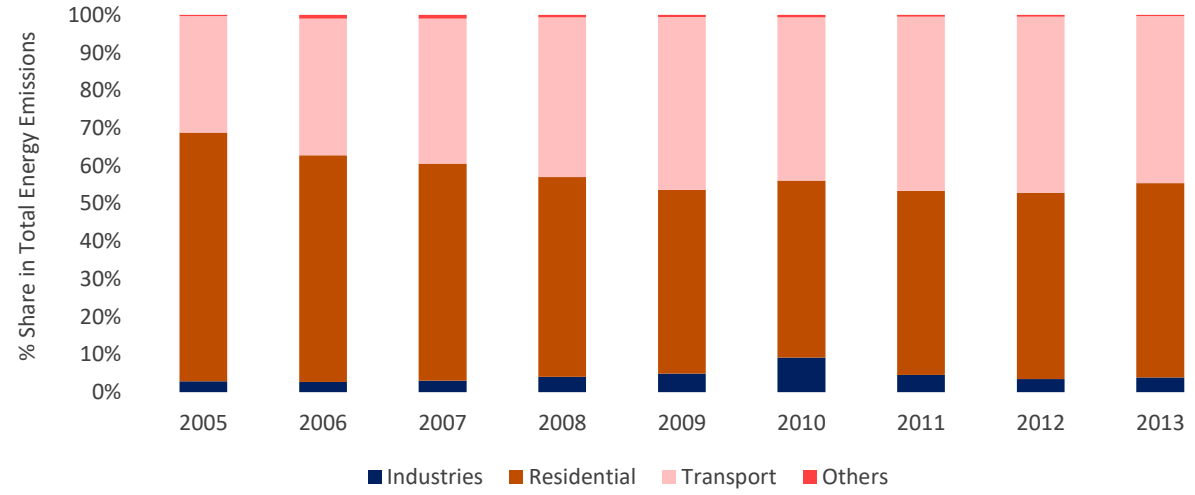
The Energy sector represented nearly 82% of total emissions in the state of Manipur in 2013 (excluding the AFOLU sector). In general, emissions from the Energy sector arise from two main sub-sectors – Fuel Combustion (Public Electricity Generation, Transport, Industries and Agriculture, Commercial and Residential categories) and Fugitive. In Manipur, emissions arose only from Fuel Combustion sub-sector. The Energy sector emissions increased at an observed CAGR of 7.00% from 0.37 $MtCO_2e$ in 2005 to 0.63 $MtCO_2e$ in 2013 (Figure 5). An interim peak was observed in 2009 due to a rise in emissions from the Transport category.

Figure 5: Emission Estimates from Energy Sector of Manipur (2005 to 2013)



Residential was a major category under the Fuel Combustion sub-sector with ~51% contribution in Manipur's Energy emissions portfolio followed by ~44% contribution from Transport in 2013. Within the Residential category, ~38% emissions were due to the usage of Charcoal alone followed by ~19% emissions from the usage of Fuelwood. Interestingly, while emissions from Fuel Combustion in the Residential category had increased at a CAGR of 11.21% from 0.24 $MtCO_2e$ in 2005 to 0.32 $MtCO_2e$ in 2013, the share of emissions from this category had decreased from ~66% in 2005 to ~51% in 2013. This was mainly because the emissions from the Transport category had increased at a higher CAGR of 16.30% from 0.11 $MtCO_2e$ in 2005 to 0.28 $MtCO_2e$ in 2013.

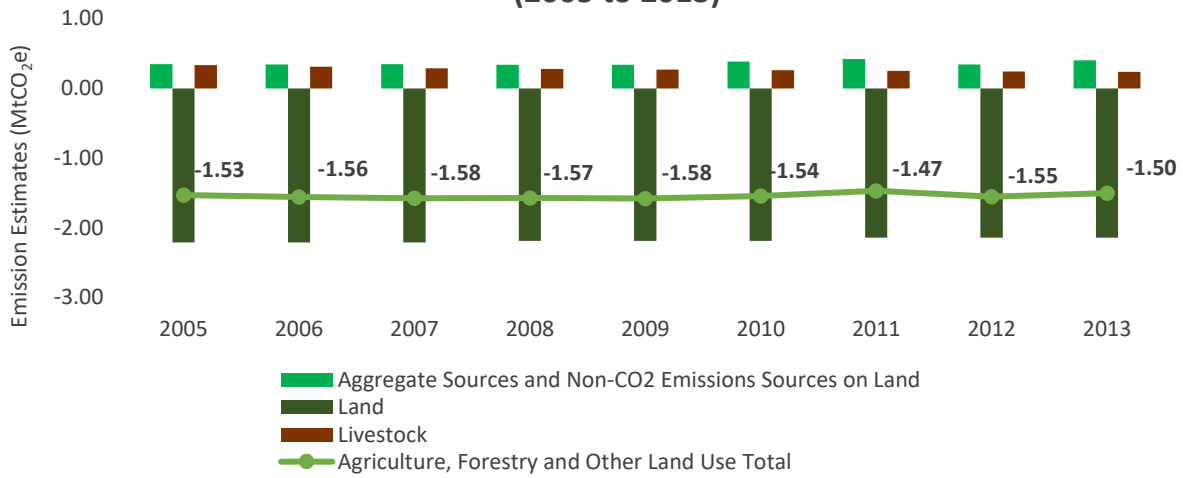
Figure 6: Share of GHG Emissions from Energy Categories (2005 to 2013)



AFOLU Sector

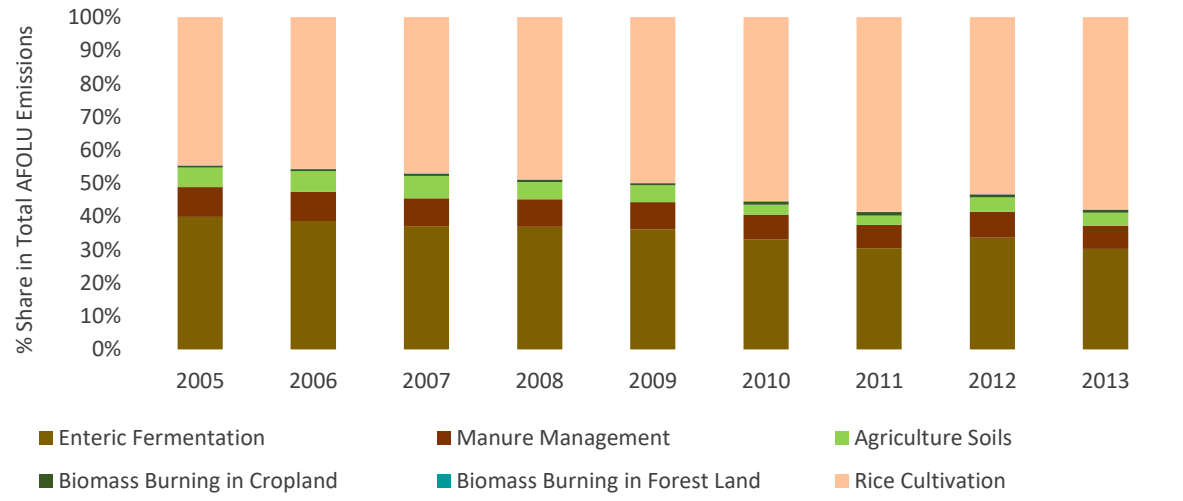
The AFOLU sector of Manipur was a net sink of GHGs in India from 2005 to 2013. Emissions/removals from this sector arise from three main sub-sectors namely Livestock, Land and Aggregate Sources and Non-CO_2 Emissions Sources on Land. The removals decreased at an observed rate of 0.24% (compounded annually) from 1.53 $MtCO_2e$ in 2005 to 1.50 $MtCO_2e$ in 2013 in Manipur (Figure 7). Notably, Land was a sink across all years from 2005 to 2013 and the removals from this sub-sector remained constant. The emissions from the Livestock sub-sector declined from 0.33 $MtCO_2e$ in 2005 to 0.24 $MtCO_2e$ in 2013 while that from the Aggregate Sources and Non-CO_2 Emissions Sources on Land increased minimally from 0.35 $MtCO_2e$ in 2005 to 0.40 $MtCO_2e$ in 2013.

Figure 7: GHG Emission Estimates from AFOLU Sector of Manipur (2005 to 2013)



If emissions were to be considered without the removals from Land sub-sector, maximum positive emissions in 2013 were from the Aggregate Sources and Non-CO_2 Emissions Sources on Land sub-sector. Amongst this sub-sector, Rice Cultivation was the major contributor of emissions with a share of 58% of the total positive emissions in 2013 (Figure 8). Emissions from Rice Cultivation had increased from 0.30 $MtCO_2e$ in 2005 to 0.37 $MtCO_2e$ in 2013. Though the second major contributor was Enteric Fermentation, the share of emissions from this category had declined from 40% in 2005 to 30% in 2013 during the reference period.

Figure 8: Share of Emissions from AFOLU categories (Excluding Land)



Waste Sector

The Waste sector contributed ~18% of total emissions of Manipur in 2013 (excluding removals from the AFOLU sector). Municipal Solid Waste[3], Domestic Wastewater and Industrial Wastewater are the key sources of GHG emissions in the Waste sector. The Waste sector emitted 0.103 $MtCO_2e$ in 2005 which increased to 0.142 $MtCO_2e$ in 2013. GHG emissions from Waste grew at a CAGR of 4.08% from 2005 to 2013 (Figure 9). However, a spike in the overall emissions was observed in 2011 which 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 9: GHG Emission Estimates from Waste Sector of Manipur (2005 to 2013)

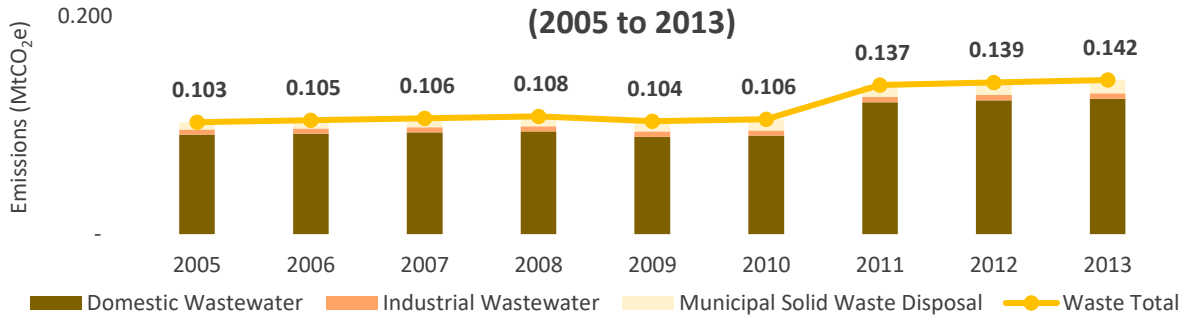
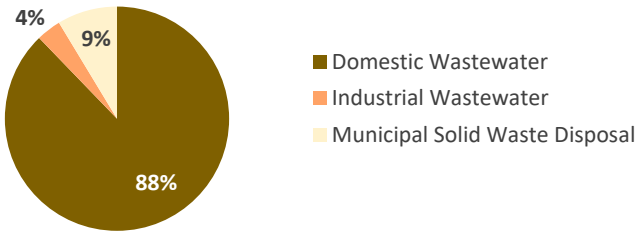


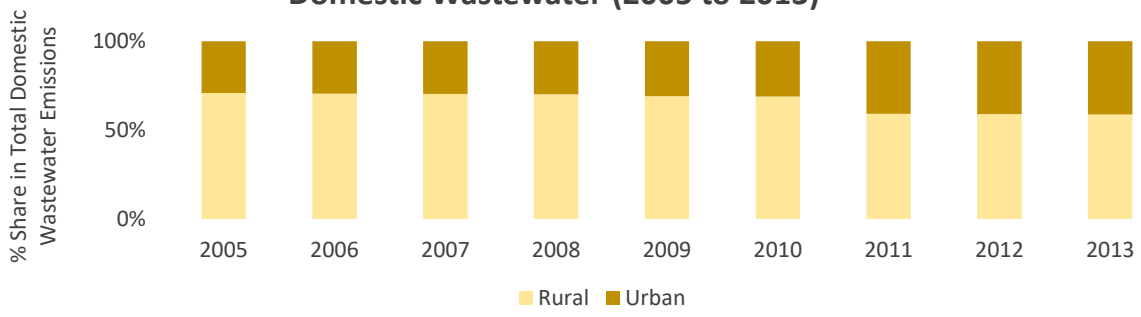
Figure 10: Category-wise Share of GHG Emissions for Waste Sector in 2013



In Manipur, maximum emissions (~88%) arose from Domestic Wastewater (Figure 10) from rural and urban areas and had increased at a CAGR of 3.91% from 0.09 $MtCO_2e$ in 2005 to 0.12 $MtCO_2e$ in 2013. Almost 59% Domestic Wastewater emissions emanated from the rural areas of Manipur in 2013 (Figure 11). Discharge of untreated wastewater and use of septic tanks are key drivers of emissions in this sub-sector.

Municipal Solid Waste Disposal contributed ~9% of emissions in 2013. Changing Solid Waste Composition resulted in an increase in the GHG emissions generated from every tonne of Solid Waste Disposed over the years in Manipur, and emissions from this category had increased at 7.73% (CAGR) from 0.007 $MtCO_2e$ in 2005 to 0.012 $MtCO_2e$. Industrial Wastewater also contributed to 4% of emissions in 2013 from Manipur's Waste sector (Figure 10).

Figure 11: Areawise GHG Emission Estimates for Domestic Wastewater (2005 to 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 CH_4 emissions

IPPU Sector

No IPPU emissions were recorded for Manipur from 2005 to 2013.

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The Platform comprises of the following civil society:

An initiative supported by

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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.

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