

Trend Analysis of GHG Emissions in JAMMU & KASHMIR

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*



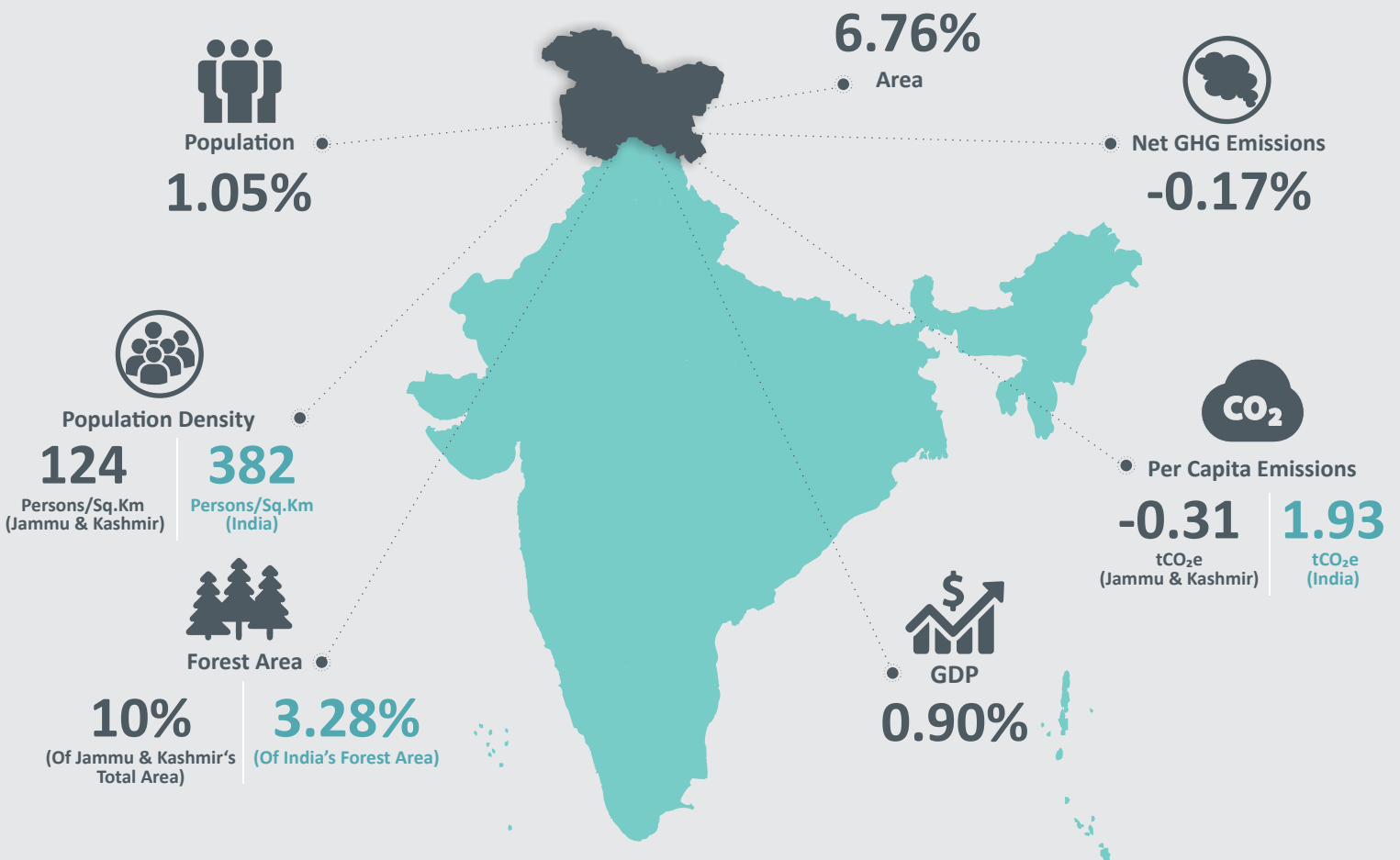
AFOLU



WASTE

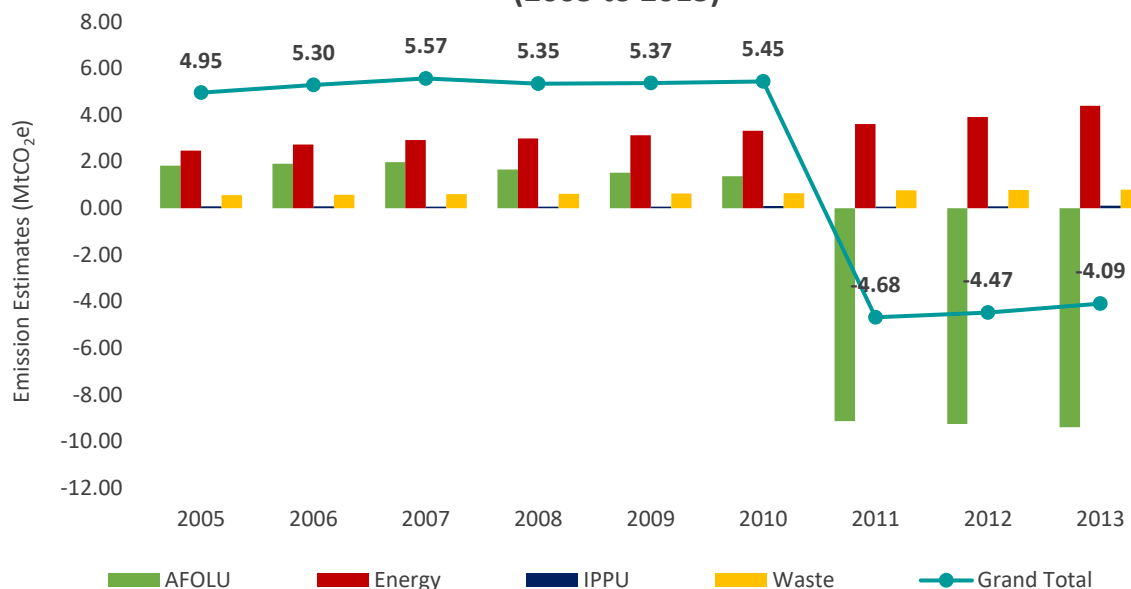
*Fuel combusted for Captive Electricity Generation (Auto-Producers) has been reported under Energy sector.

Jammu & Kashmir at a glance (2013)



Economy-wide Emission Estimates

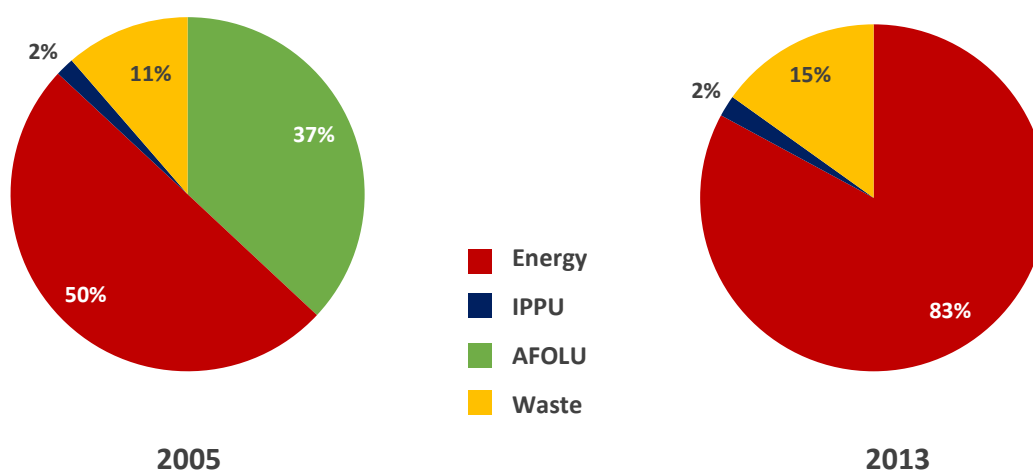
Figure 1: GHG Emission Estimates for Jammu & Kashmir (2005 to 2013)



Jammu & Kashmir was a carbon negative state with a net sink of 4.09 MtCO₂e in 2013¹. Notably, Jammu & Kashmir was a net positive emitter till the year 2010 as depicted in Figure 1 above. In 2011, however, it became a net sink since the net removals from the AFOLU sector were more than the combined emissions from other sectors. The total emissions of this state grew at a CAGR² of 1.91% from 4.95 MtCO₂e in 2005 to 5.45 MtCO₂e in 2010. From 2011 onwards, the net removals declined at a rate of 6.54% (compounded annually) from 4.68 MtCO₂e to 4.09 MtCO₂e in 2013.

In 2005, the share of the Energy sector was the maximum (~50%) followed by the AFOLU (~37%) Waste (~11%) and IPPU (~2%) sectors. If values were considered excluding the AFOLU sector, the Energy sector was the major emitter with a share of ~83% in 2013. While the shares of the Waste and IPPU sectors were ~15% and ~2% respectively as shown in Figure 2 below.

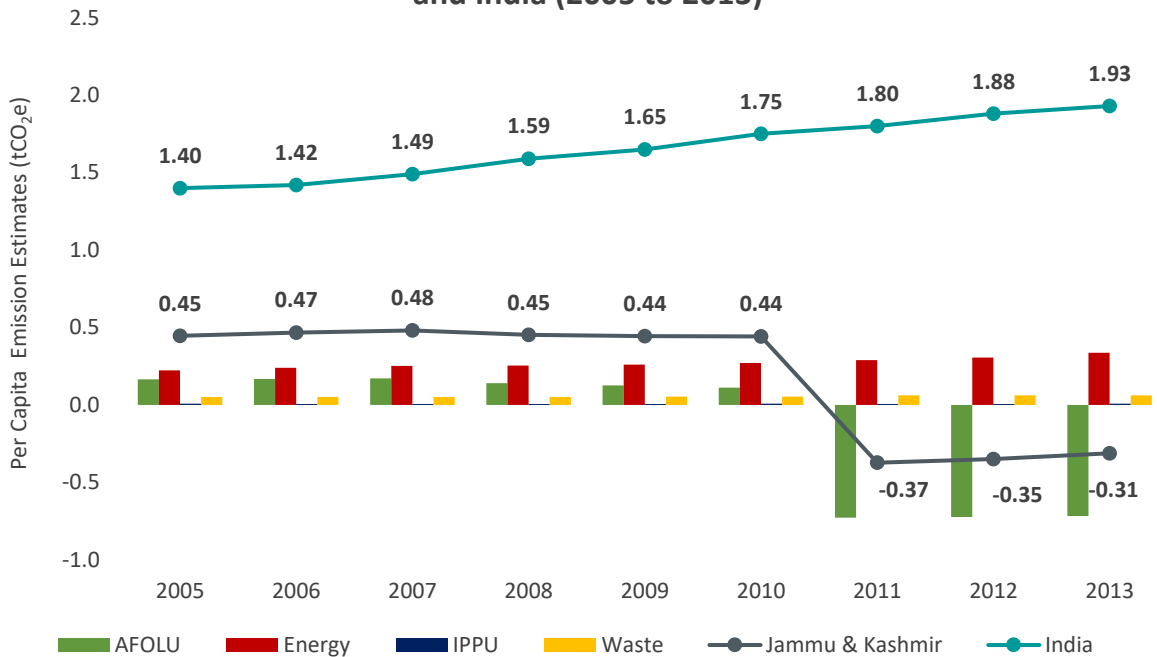
Figure 2: Sector-wise Contribution to Economy-wide GHG Emissions (Excluding AFOLU Sector in 2013)



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

² Compound Annual Growth Rate

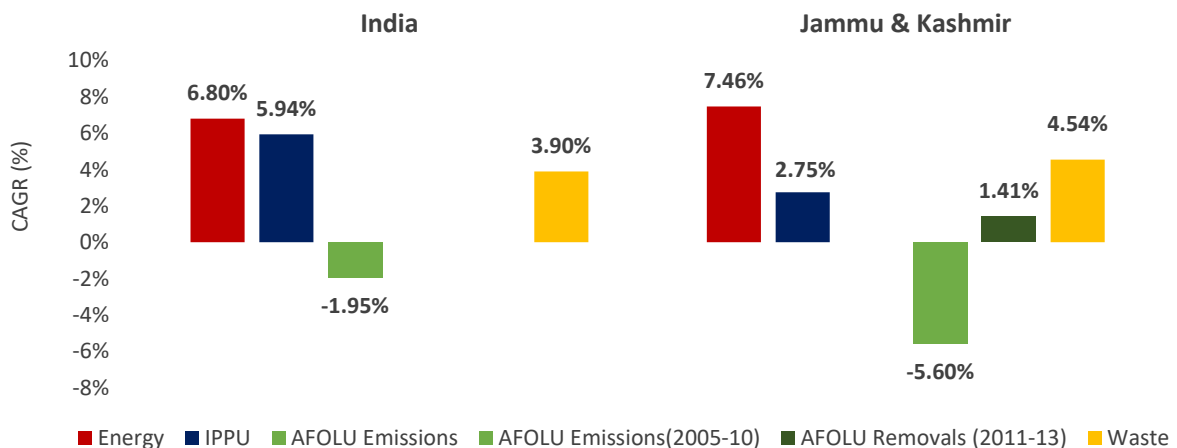
Figure 3: Per Capita GHG Emissions for Jammu & Kashmir and India (2005 to 2013)



The per capita emissions of Jammu & Kashmir remained almost stagnant till the year 2010. In 2011, a sudden dip was observed in the per capita emissions due to increased removals from the AFOLU sector, transforming per capita emissions to per capita removals in Jammu & Kashmir. This state had per capita emissions that were well below the per capita emissions of India, across all the reference years as illustrated in Figure 3 above. The observed per capita emissions of the state declined at a rate of 0.16% (compounded annually) from 0.45 tCO₂e in 2005 to 0.44 tCO₂e in 2010. The per capita removals declined from 0.37 tCO₂e in 2011 to 0.31 tCO₂e in 2013 at a rate of 0.06% (compounded annually). The observed CAGR of per capita emissions of India was 4.07% from 2005 to 2013.

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

These growth rates have been compounded annually.



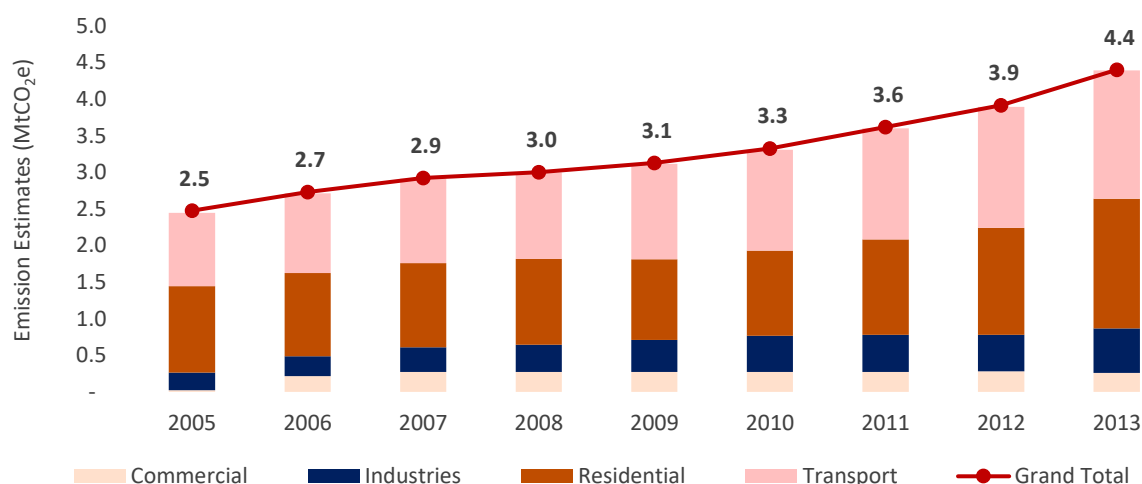
GHG emissions from the Energy sector recorded the highest CAGR of 7.46% from 2005 to 2013. From 2005 to 2010, the emissions from the AFOLU sector declined at a compounded rate of 5.60%. However, the per capita removals from 2011 onwards increased at a rate of ~1.41% as shown in Figure 4 above. The observed CAGR of the IPPU and Waste sectors was 2.75% and 4.54% respectively from 2005 to 2013. When compared to India, the Energy and Waste sectors observed a higher growth rate of GHG emissions in Jammu & Kashmir from 2005 to 2013.



Energy Sector

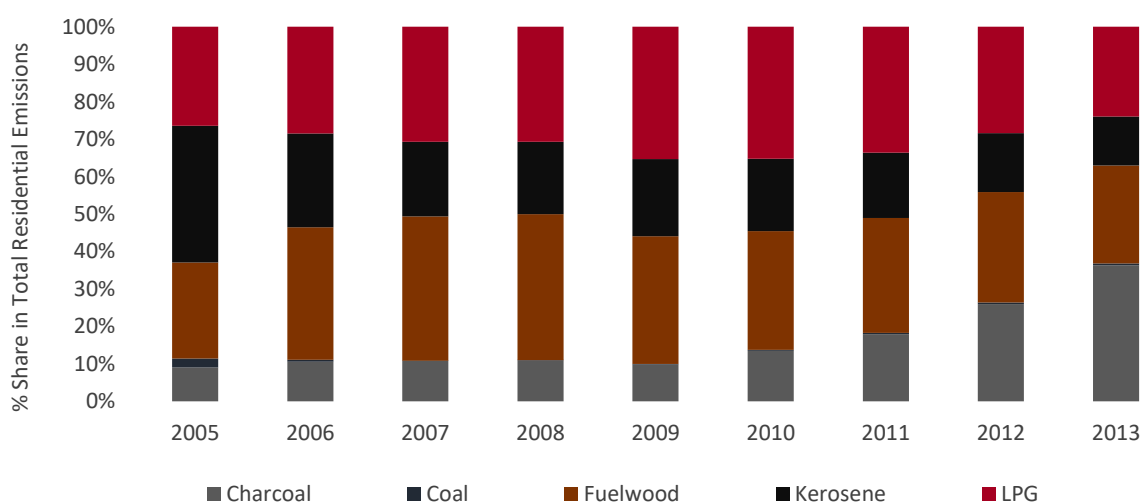
The Energy sector represented ~83% of the total emissions (if values were considered excluding the AFOLU sector) of Jammu and Kashmir in 2013. In general, emissions from the Energy sector arise from two main sub-sector – Fuel Combustion (Public Electricity Generation, Transport, Industries and Agriculture, Commercial and Residential categories) and Fugitive. But in the state of Jammu & Kashmir, emissions were registered only from Fuel Combustion across all the reference years. Emissions from this sector grew at an estimated CAGR of 7.46% from 2.5 MtCO₂e in 2005 to 4.4 MtCO₂e in 2013 as depicted in Figure 5 below.

Figure 5: GHG Emission Estimates for Jammu & Kashmir (2005 to 2013)



The Transport and Residential categories were the top two emitters of GHGs in this sector, contributing ~40% each in 2013. Nearly 88% of the Transport emissions in 2013 were due to Road Transportation while the remaining 12% were due to Aviation (~9%) and Railways (~3%) respectively. Within the Residential category, emissions due to the usage of Charcoal in the households of Jammu & Kashmir was the major contributor of GHG emissions in 2013 and the share of emissions from this category was found to increase four folds from ~9% in 2005 to ~36% in 2013 as illustrated in Figure 6 below. The share of other sub-categories changed only slightly over the reference years.

Figure 6: Share of GHG Emissions for Residential Category (2005 to 2013)

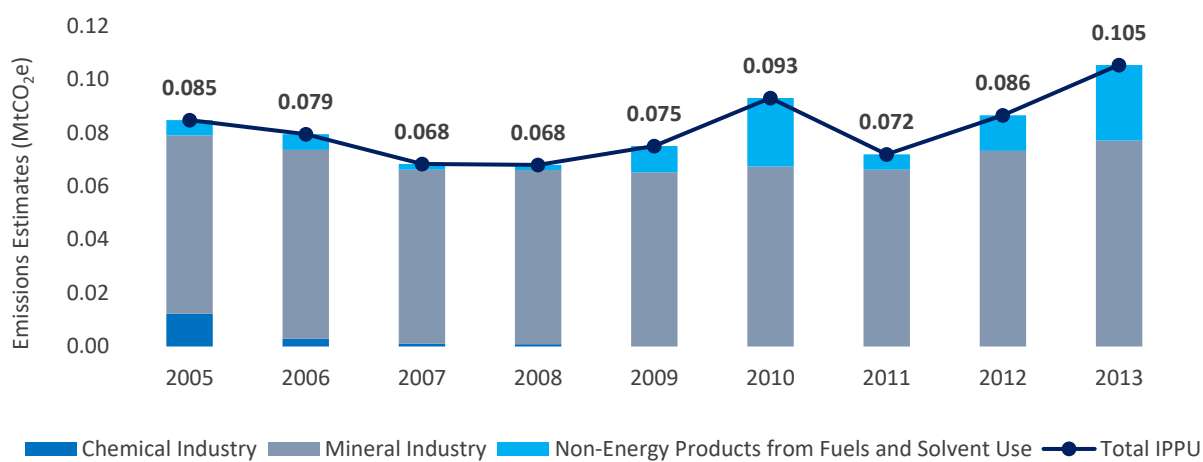




IPPU Sector

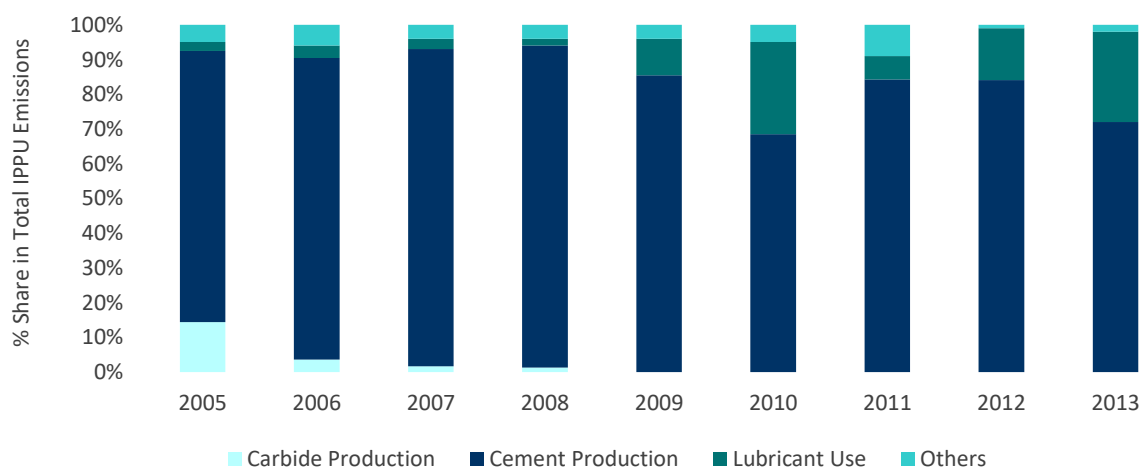
The IPPU sector represented ~2% of the total emissions (if values were considered excluding AFOLU sector) of Jammu & Kashmir in 2013. In Jammu & Kashmir, the majority of the emissions (~73%, in 2013) were due to the Mineral Industries across all the reference years. Between 2005 and 2013, the overall IPPU emissions grew at a CAGR of 2.75% from 0.085 MtCO₂e in 2005 to 0.105 MtCO₂e in 2013. In 2010, an interim peak was observed in the total emissions of this sector due to increased emissions of Non- Energy Products from Fuels and Solvent Use as illustrated in Figure 7 below. Emissions from fuel use in Chemical Industries was only observed in the years 2005 and 2006.

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



A detailed trend of GHG emissions by various IPPU categories is depicted in Figure 8 below. Cement Production was a key driver of IPPU emissions across all the reference years. However, significant variations in emissions were also observed due to the usage of Lubricants along with some minor emissions from other categories during the reference period. The yearly variation in emissions estimates was a resultant of inconsistent activity data on Lubricant Consumption by the IPPU sector.

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

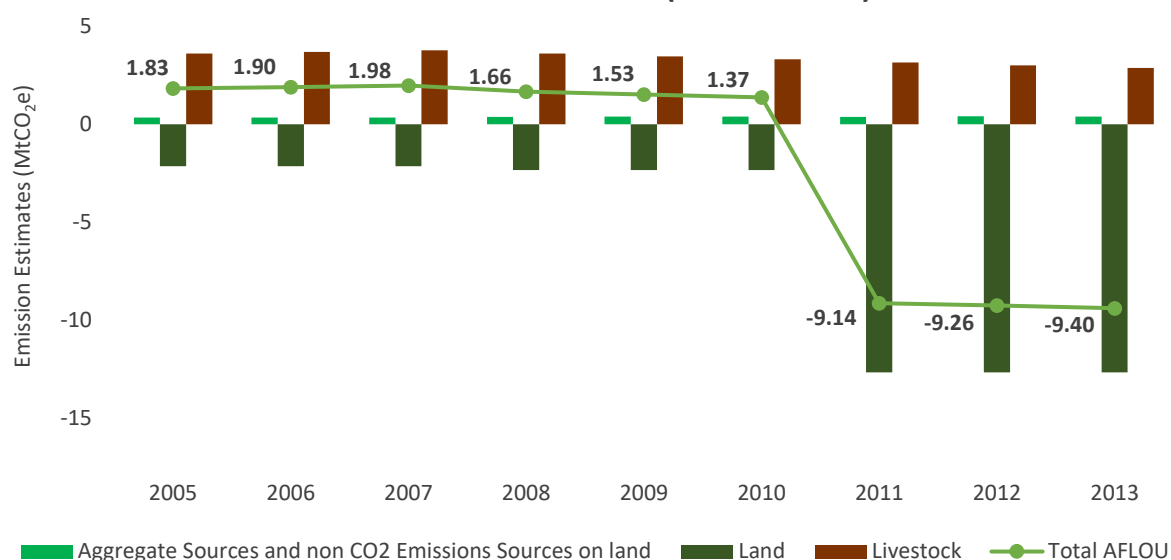




AFOLU Sector

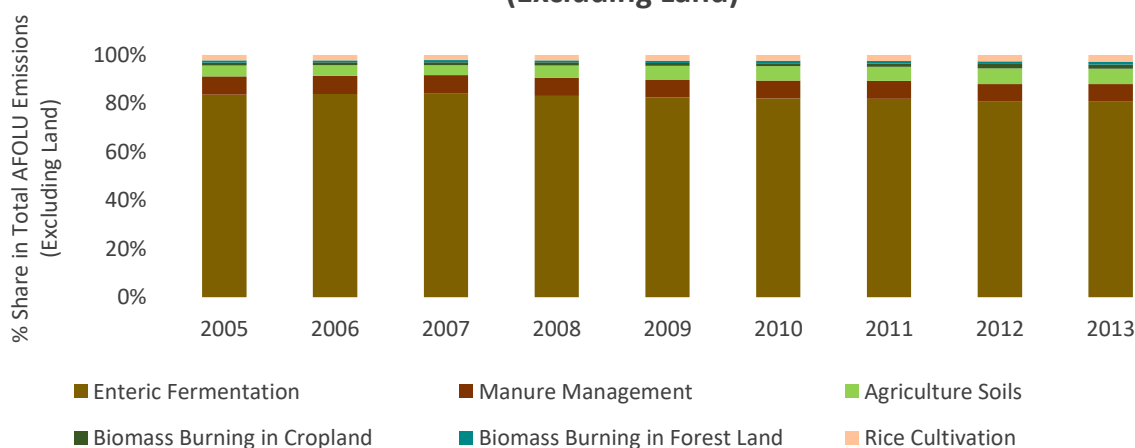
The AFOLU sector in Jammu & Kashmir removed 9.40 MtCO₂e of GHG emissions in 2013. Notably, the AFOLU sector of Jammu & Kashmir was a net emitter of GHGs from 2005 to 2010 but it became a net sink thereafter. Emissions from AFOLU sector arise from three main sub-sectors namely Livestock, Land and Aggregate Sources and Non-CO₂ Emissions Sources on Land. While Livestock and Aggregate Sources and Non-CO₂ Emissions Sources on Land were net GHG emitters, the Land sub-sector was a net sink across all the reference years. Notably, the AFOLU emissions declined at a rate of 5.60% from 1.83 MtCO₂e in 2005 to 1.37 MtCO₂e in 2010. The net carbon removals from this sector grew at a CAGR of 1.41% from -9.14 MtCO₂e in 2011 to -9.40 MtCO₂e in 2013. In 2011 as removals from the Land sub-sector increased enormously, the state became a net sink from a net emitter.

Figure 9: GHG Emission Estimates for AFOLU Sector in Jammu & Kashmir (2005 to 2013)



If emissions were considered without taking the Land sub-sector into account, Enteric Fermentation remained the maximum emitter across all the years, with its share being nearly 84% in 2005 and declining slightly to 81% in 2013. The decline in the share of Livestock (Enteric Fermentation) emissions is perhaps a reflection of decreased Animal Husbandry activities in the state. The share of emissions from all other categories followed an almost linear growth curve as depicted in Figure 10 below.

Figure 10: Share of GHG Emissions for AFOLU Sub-sectors (Excluding Land)





Waste Sector

The Waste sector contributed to ~15% of total emissions (if values were considered excluding AFOLU sector) of Jammu & Kashmir 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 a CAGR of 4.54% from 0.56 MtCO₂e in 2005 to 0.8 MtCO₂e in 2013. An interim rise in the emissions of this sector was observed in 2011 owing to increased emissions from Domestic wastewater which reflects changing trends in use of various treatment systems as reported in Census of India 2011 as shown in Figure 11 below.

Figure 11: GHG Emission Estimates for Waste Sector in Jammu & Kashmir (2005 to 2013)

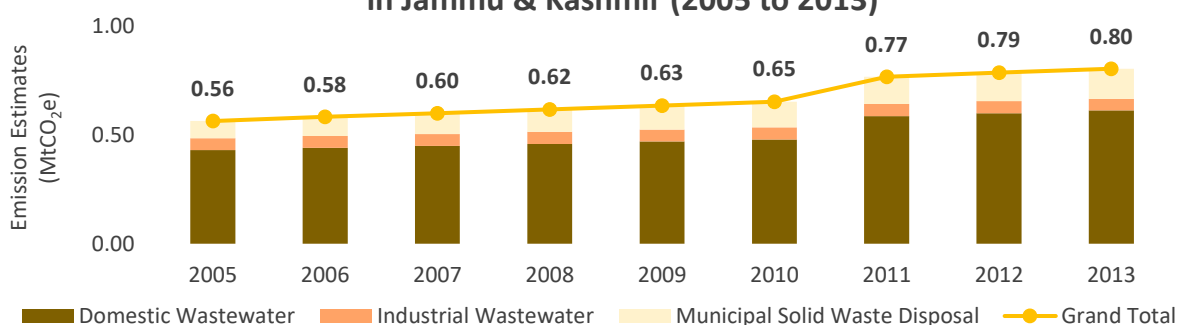
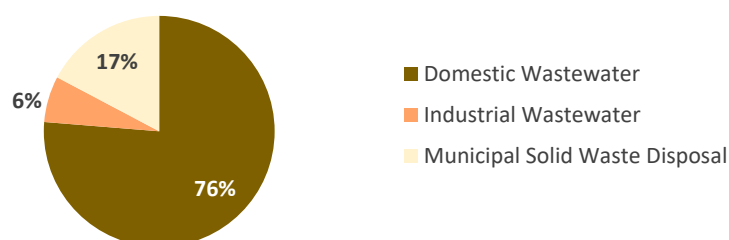


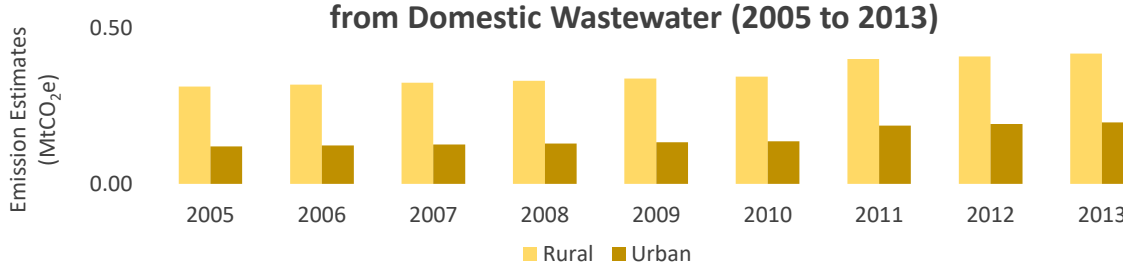
Figure 12: Category-wise Share of GHG Emissions for Waste Sector (in 2013)



Domestic Wastewater had a share of ~76% in the total emissions of the Waste sector in 2013 (Figure 12). Emissions from this sub-sector grew at CAGR of 4.51% from 0.43 MtCO₂e in 2005 to 0.61 MtCO₂e in 2013. As inferred from Figure 13 below, emissions of the Domestic Wastewater emanating from the rural areas contributed the most to this sub-sector across all the reference years. In 2013, ~68% of Domestic wastewater emissions emanated from the rural areas of Jammu & Kashmir. Discharge of untreated wastewater and use of septic tanks are key drivers of emissions in this sub-sector.

Municipal Solid Waste represented ~17% of the Waste emissions in 2013. Emissions from this sub-sector grew at an estimated CAGR of 7.27% from 0.08 MtCO₂e in 2005 to 0.14 MtCO₂e in 2013. Industrial Wastewater represented nearly 6% of total emissions of the Waste sector in 2013. Emissions from this sub-sector declined at an estimated rate of 0.39% (compounded annually) from 0.053 MtCO₂e in 2005 to 0.052 MtCO₂e in 2013. Pulp and Paper Industry (~87%) and Meat Industry (~13%) were the only two emitters of GHGs in this sub-sector in 2013.

Figure 13: Areawise GHG Emissions Estimates from 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 CH₄ emissions



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The Platform comprises of the following civil society:



An initiative supported by



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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