GHG Platform INDIA

Trend Analysis of GHG Emissions in KARNATAKA

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.

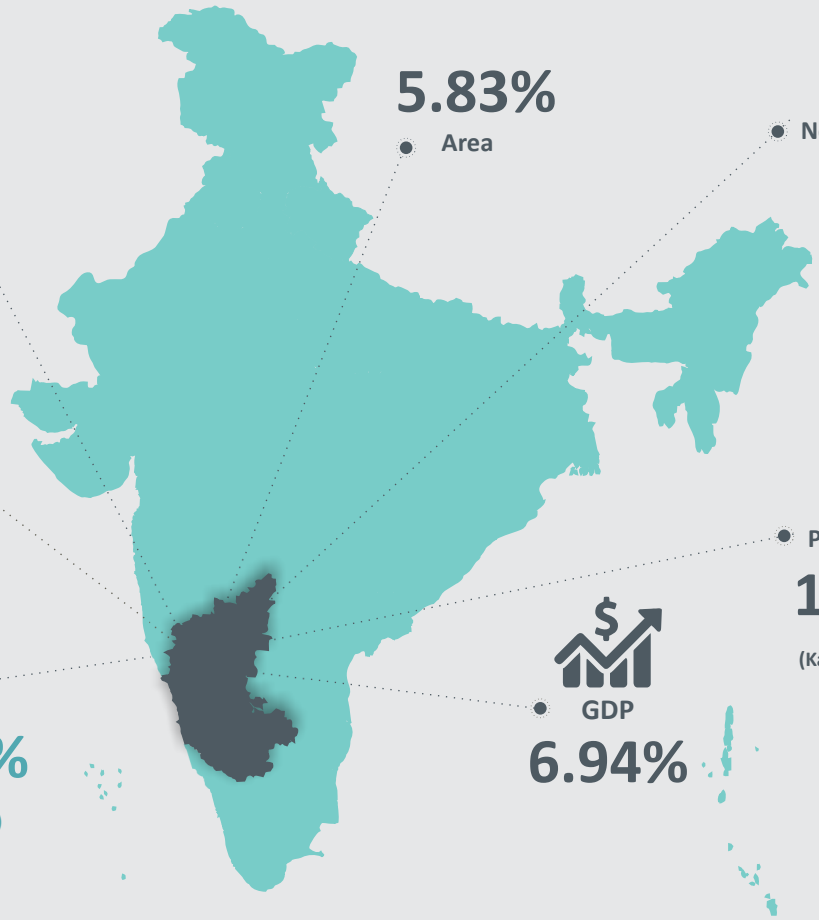
The Platform seeks to add value to the various ongoing GHG emission estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

Karnataka at a glance (2013)



Population
5.03%

5.83%
Area

Net GHG Emissions
4.98%

Population Density
319 Persons/Sq.Km (Karnataka)
382 Persons/Sq.Km (India)

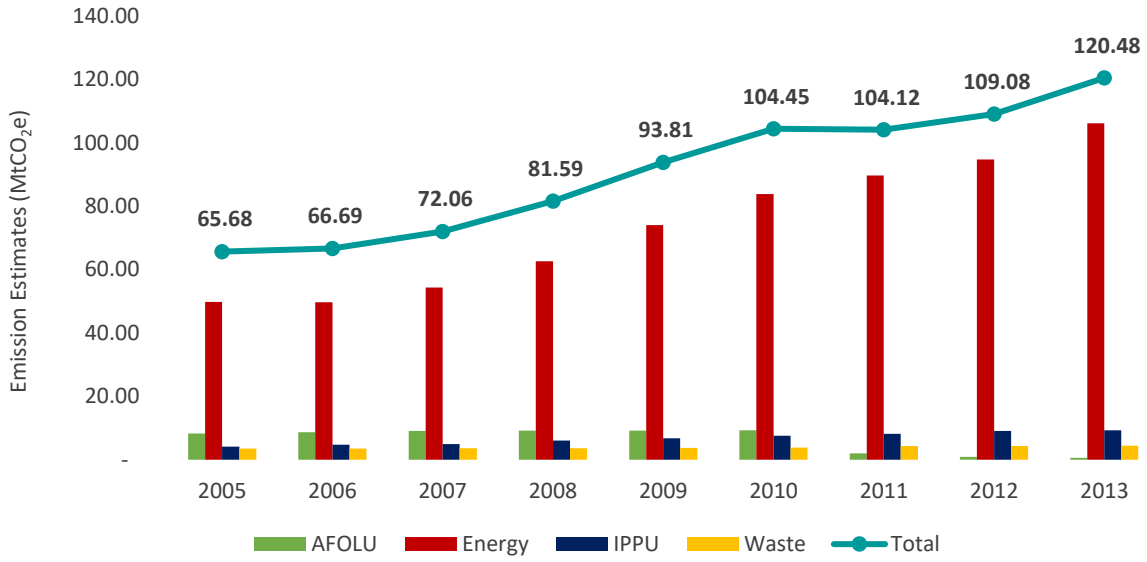
Per Capita Emissions
1.92 tCO_2e (Karnataka)
1.93 tCO_2e (India)

Forest Area
19% (Of Karnataka's Total Area)
5.19% (Of India's Forest Area)

GDP
6.94%

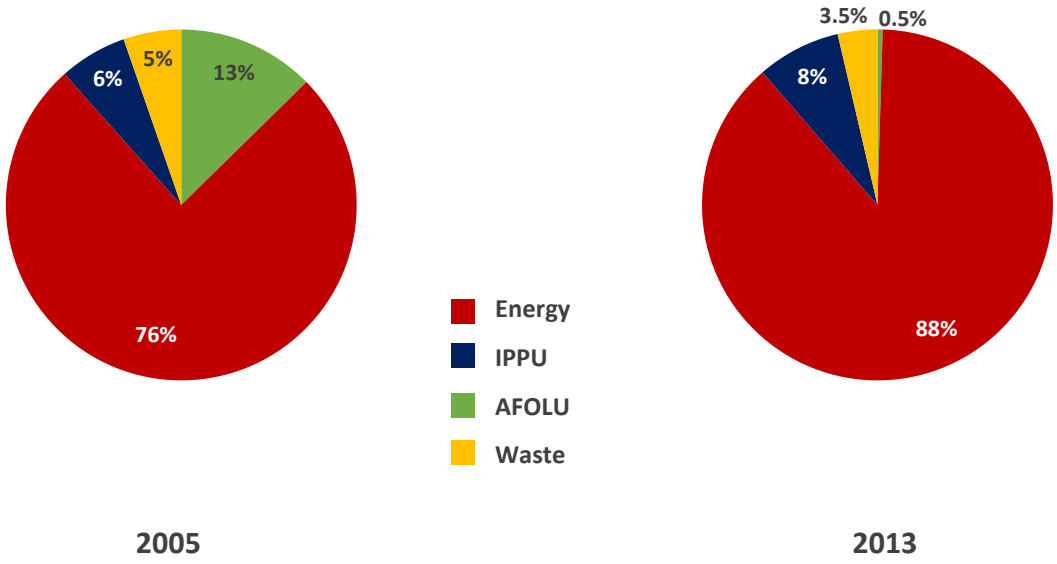
Economy-wide Emission Estimates

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



Emissions of Karnataka grew from 65.68 $MtCO_2e$ to 120.48 $MtCO_2e$ at an estimated CAGR[1] of 7.88% from 2005 to 2013[2]. Almost ~88% of emissions of Karnataka were from the Energy Sector and ~8% from the IPPU sector in 2013. While emissions from the Energy sector grew at a rate of 9.94% (CAGR), the AFOLU sector emissions declined by 28.39% (compounded annually). Due to the high negative rate of emissions from the AFOLU sector, the share of emissions from this sector decreased from ~13% in 2005 to ~0.5% in 2013.

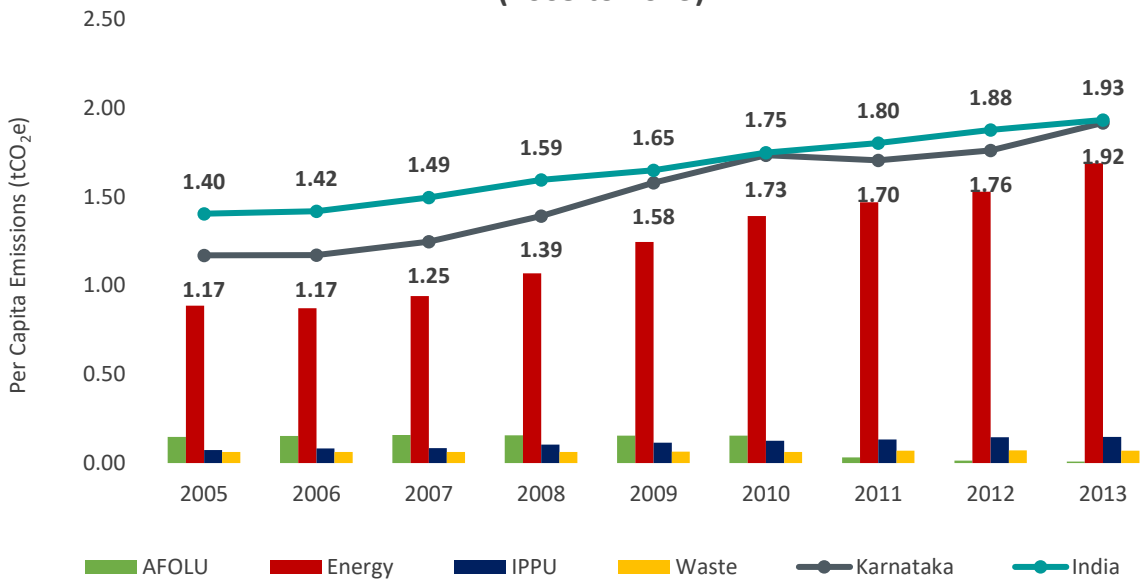
Figure 2: Sector-wise Contribution to Economy-wide GHG Emissions of Karnataka



[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.

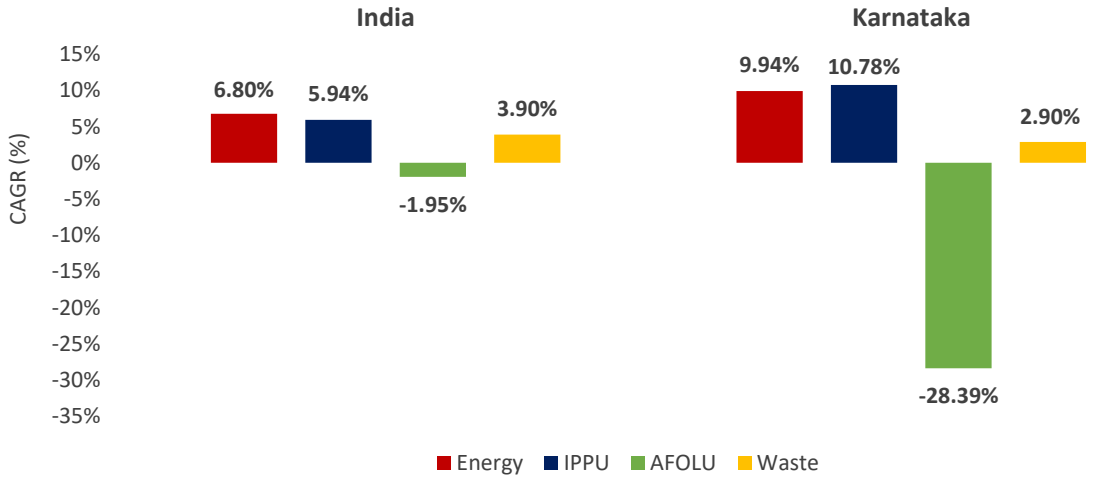
Figure 3: Per Capita GHG Emissions for Karnataka and India (2005 to 2013)



Per Capita emissions from Karnataka grew from 1.17 tCO_2e in 2005 to 1.92 tCO_2e in 2013. When compared to per capita emissions of India, Karnataka recorded slightly lower per capita emissions than India in 2005, but had caught up by 2013. The compound annual growth rate of per capita emissions of India and Karnataka was 4.07% and 6.36% respectively (Figure 3).

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

These growth rates have been compounded annually.

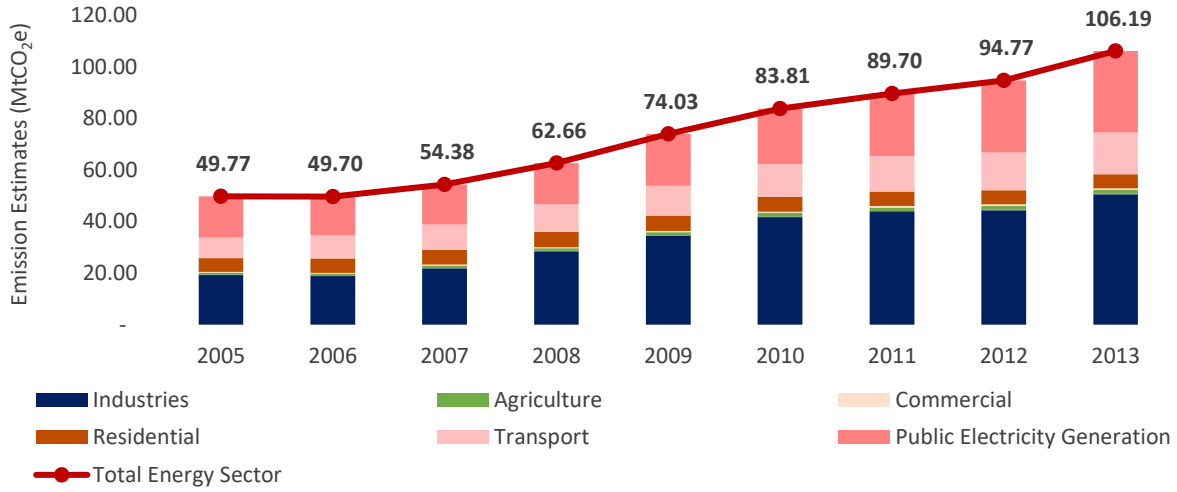


The IPPU sector in Karnataka recorded the highest growth rate of GHG emissions (10.78%) followed by the Energy sector (9.94%) from 2005 to 2013. When compared to India, the sectoral growth rates of the GHG emissions of Karnataka were higher than that of the country for all the sectors except the AFOLU & Waste sectors. The AFOLU sector of Karnataka had a much higher decline rate of GHG emissions (-28.39%) in comparison with India, which recorded -1.95% rate of decline of GHG emissions. The growth rates of GHG emissions from the Waste sector for India and Karnataka was 3.90% and 2.90% respectively.

Energy Sector

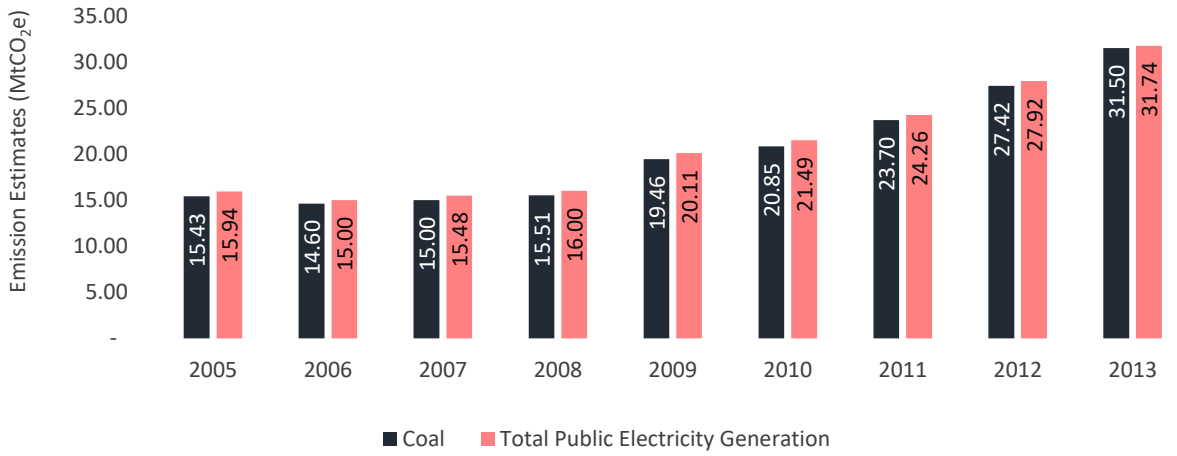
The Energy sector represented 88% of the total emissions of Karnataka in 2013. In general, emissions from the Energy sector arise from two main sub-sectors – Fuel Combustion (Public Electricity Generation, Transport, Industries and Agriculture, Commercial and Residential categories) and Fugitive. In Karnataka, emissions arose only from Fuel combustion and none from the Fugitive sub-sector. The Energy sector emissions increased at a CAGR of 9.94% from 49.77 $MtCO_2e$ in 2005 to 106.19 $MtCO_2e$ in 2013.

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



Industries was a major category under the Fuel Combustion sub-sector with 47% contribution in Karnataka's Energy emissions portfolio followed by 30% contribution from Public Electricity Generation in 2013. Amongst all Industries, maximum emissions (~60%) arose from the Iron and Steel Industry. Within the Public Electricity Generation Category, 99% emissions arose from Coal-based Power Generation as depicted in Figure 6 below. The total emissions from Coal-based Power Generation increased at an estimated CAGR of 9.33% from 2005 to 2013 while emissions from Public Electricity Generation had increased from 2005 to 2013 at a CAGR of 9%.

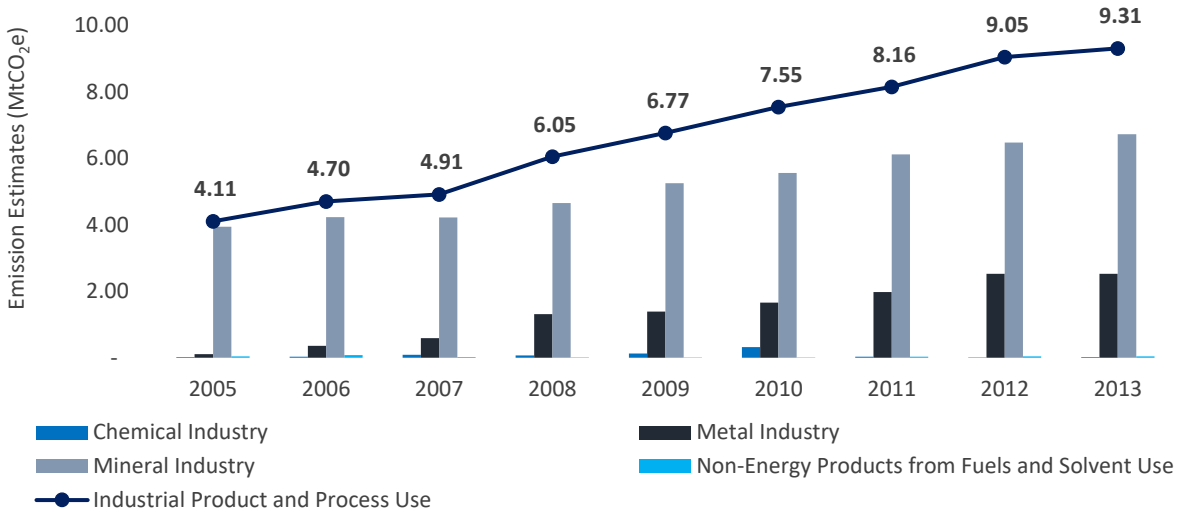
Figure 6: GHG Emission Estimates from Coal-based Power Generation (2005 to 2013)



IPPU Sector

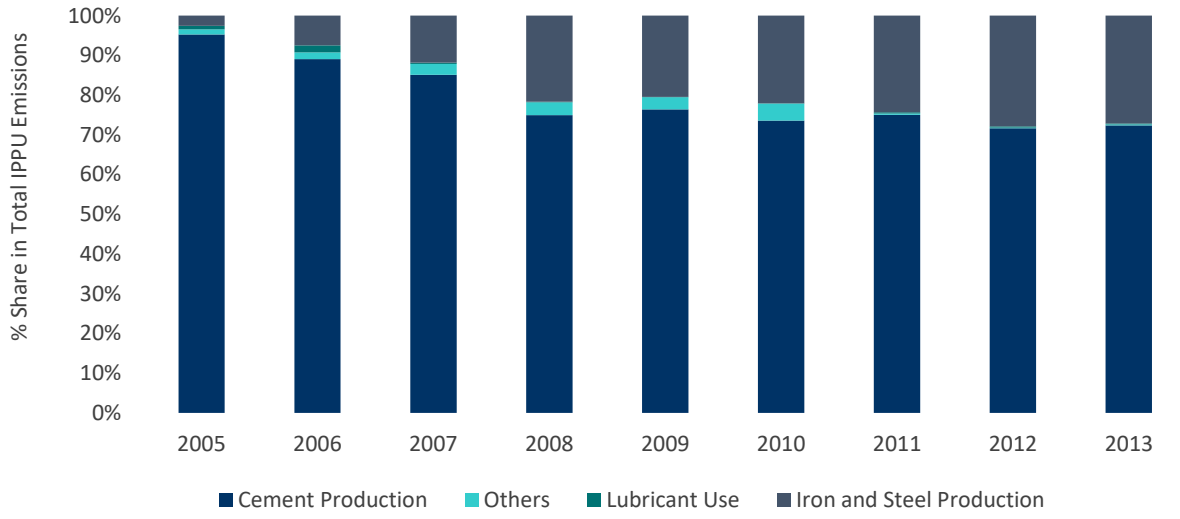
The IPPU sector represented ~8% of the total GHG emissions of Karnataka in 2013. Emissions from the IPPU sector are largely driven by Chemical, Metal, Mineral Industries and Non-Energy Products from Fuels and Solvent Use. Between 2005 to 2013, the overall IPPU emissions in Karnataka rose at a CAGR of 10.78% from 4.11 $MtCO_2e$ in 2005 to 9.31 $MtCO_2e$. Maximum emissions arose from the Mineral Industry followed by the Metal Industry in Karnataka.

Figure 7: GHG Emission Estimates for IPPU sector in Karnataka (2005 to 2013)



Cement Production was a key driver of IPPU emissions throughout 2005 to 2013 as shown in Figure 8. Notably, while the share of emissions from Cement Production declined from 95% in 2005 to 72% in 2013, the share of emissions from Iron and Steel Production were on a rise from 3% in 2005 to 27% in 2013. By 2013, the share of Cement Production and Iron & Steel Production in the overall IPPU emissions represented roughly 99% of the total IPPU emissions of Karnataka.

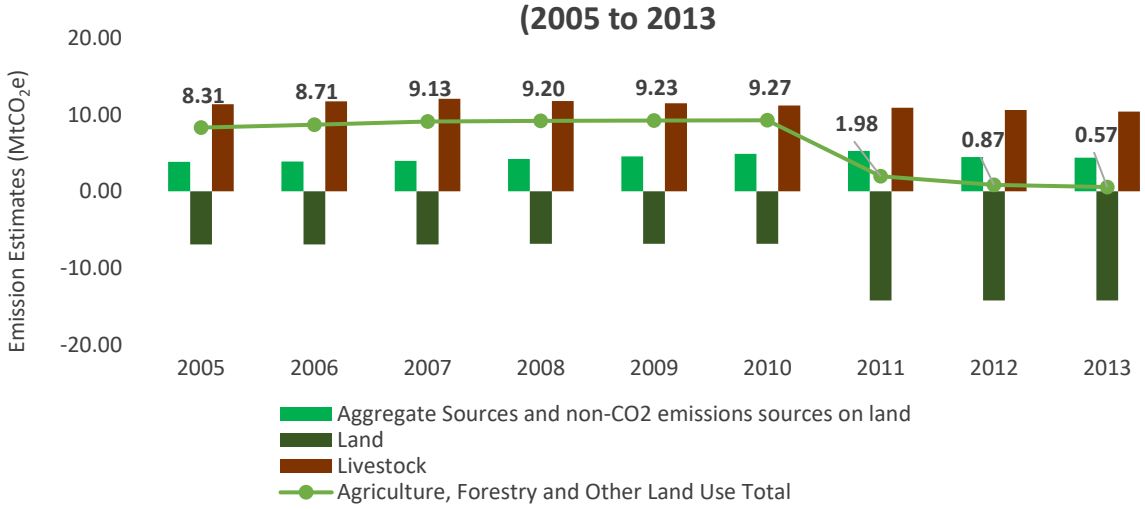
Figure 8: Share of GHG Emissions from IPPU Categories (2005 to 2013)



AFOLU Sector

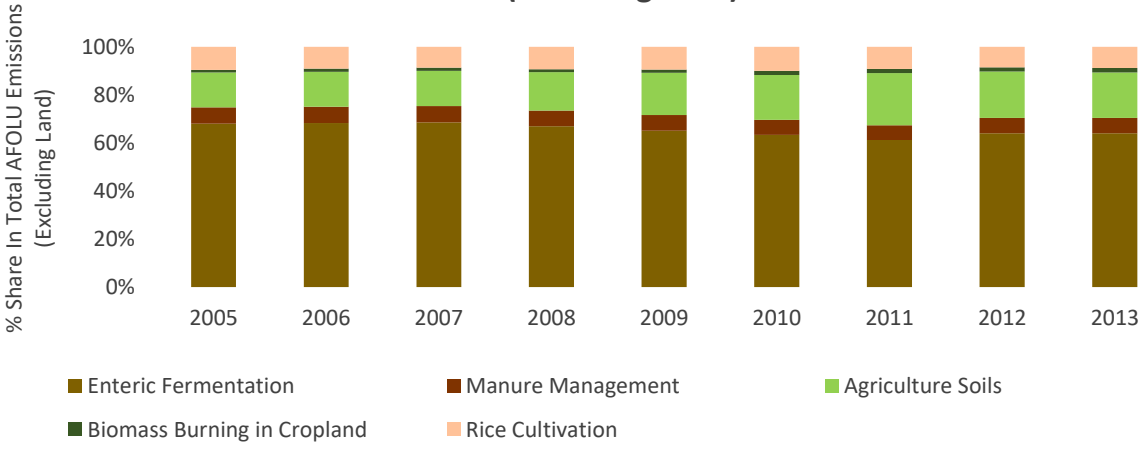
Emissions from the AFOLU sector represented 0.5% of emissions of Karnataka in 2013. Emissions from the AFOLU sector arise from three main sub-sectors namely Livestock, Land and Aggregate Sources and Non-CO_2 Emissions Sources on Land. The AFOLU emissions decreased from 8.31 $MtCO_2e$ in 2005 to 0.57 $MtCO_2e$ in 2013 (Figure 9). The reason for the decline in emissions from the AFOLU sector was the increase in absorption/removals from the Land sub-sector in Karnataka offsetting the increase in emissions from Livestock and Aggregate Sources and Non-CO_2 Emissions Sources on Land. Notably, the Land sub-sector was a sink throughout the reference period in Karnataka.

Figure 9: GHG Emission Estimates for AFOLU Sector in Karnataka (2005 to 2013



Out of the three sub-sectors, maximum positive emissions in year 2013 were from Livestock sub-sector (Enteric Fermentation & Manure Management). While Livestock sub-sector was a major contributor, emissions from this sector declined throughout the reference period. Enteric Fermentation contributed to ~64% of the AFOLU emissions followed by Agricultural Soils with a 19% share. Notably, contribution of Enteric Fermentation emissions was decreasing and that of Agricultural Soils was increasing throughout the reference period (Figure 10). These trends perhaps were a reflection of shrinking dairy livestock populations and increasing use of chemical fertilisers in Karnataka.

Figure 10: Share of GHG Emissions from AFOLU Sub-Sectors (Excluding Land)



Waste Sector

The Waste sector contributed to ~4% of total emissions of Karnataka in 2013. Municipal Solid Waste[3], Domestic Wastewater and Industrial Wastewater are the key sources of GHG emission in the Waste sector. The Waste sector emitted 4.40 $MtCO_2e$ in 2013 compared to 3.50 $MtCO_2e$ in 2005. GHG emissions from Waste grew at a CAGR of 2.90% from 2005 to 2013. However, a spike in the overall GHG 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 11).

Figure 11: GHG Emission Estimates for Waste Sector in Karnataka (2005 to 2013)

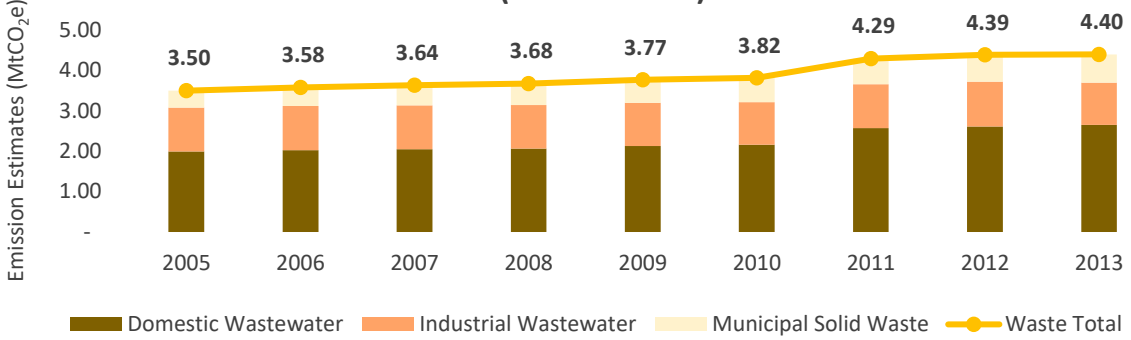
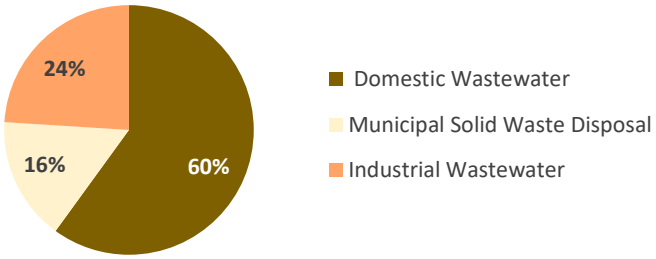


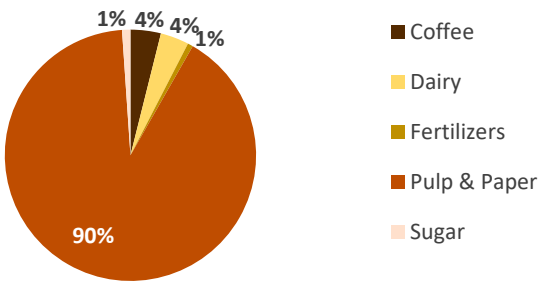
Figure 12: Category-wise Share of GHG Emissions for Waste Sector (in 2013)



Maximum emissions (60%) arose from Domestic Wastewater from rural and urban areas of Karnataka and increased at a CAGR of 4% from 2005 to 2013. Discharge of untreated wastewater and use of septic tanks are key drivers of emissions in this sub-sector. Municipal Solid Waste Disposal contributed 16% of emissions in year 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 Karnataka and emissions from this category increased at 7% (CAGR) from 2005 to 2013.

Industrial Wastewater contributed to the remaining 24% of Waste sector emissions in 2013. Deep diving into the various Industries, it was observed that almost 91% Industrial Wastewater emissions arose from Pulp and Paper industries followed by 4% from Coffee and Dairy Waste respectively in 2013.

Figure 13: Share of Emissions from Industrial Wastewater Categories in 2013



[3] 'Refers to emission in urban areas. Emissions from 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'

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The Platform comprises of the following civil society:

An initiative supported by

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