GHG Platform INDIA

Trend Analysis of GHG Emissions in RAJASTHAN

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.

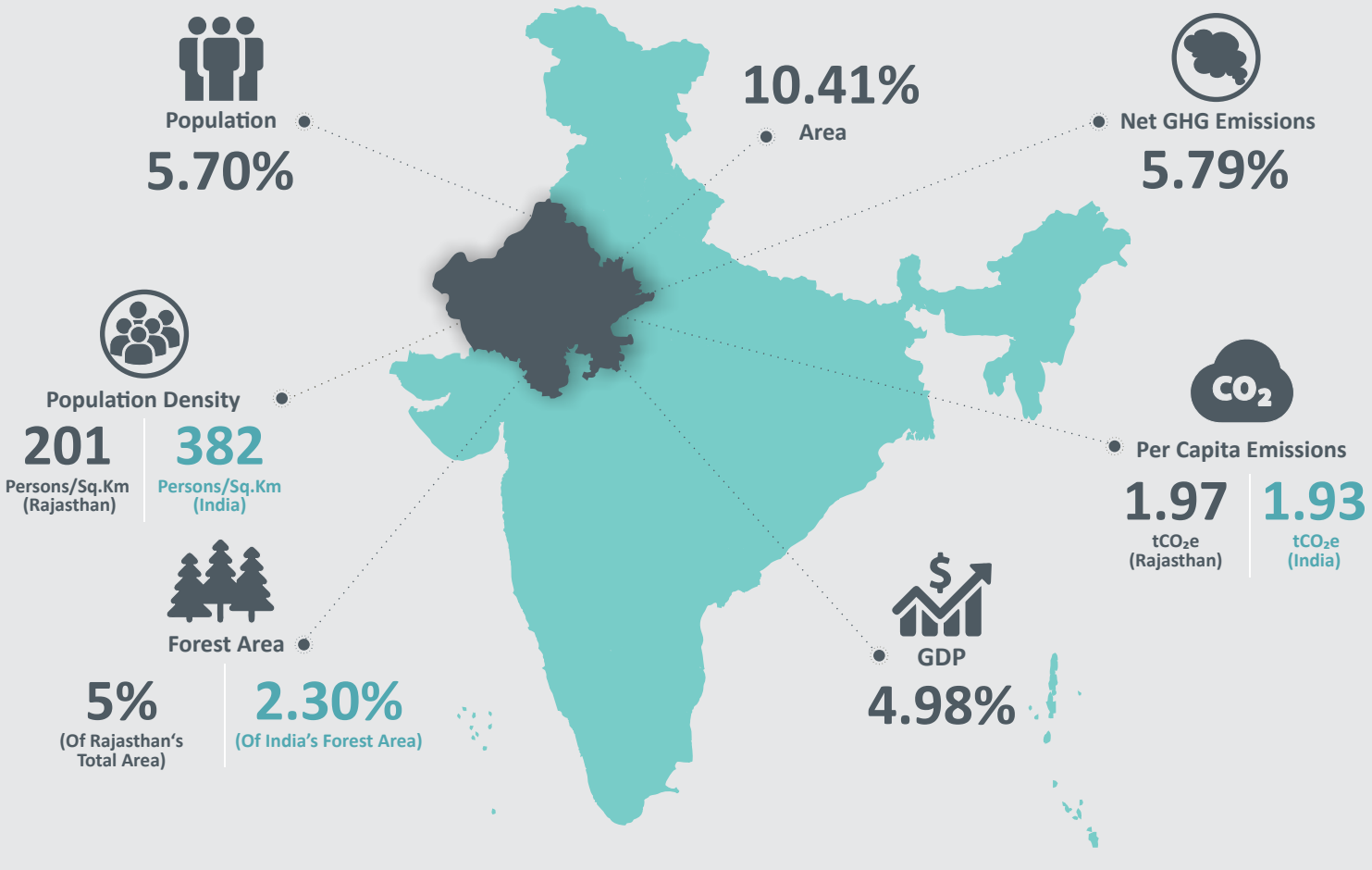
The Platform seeks to add value to the various ongoing GHG emission estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

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

ENERGY | IPPU* | AFOLU | WASTE

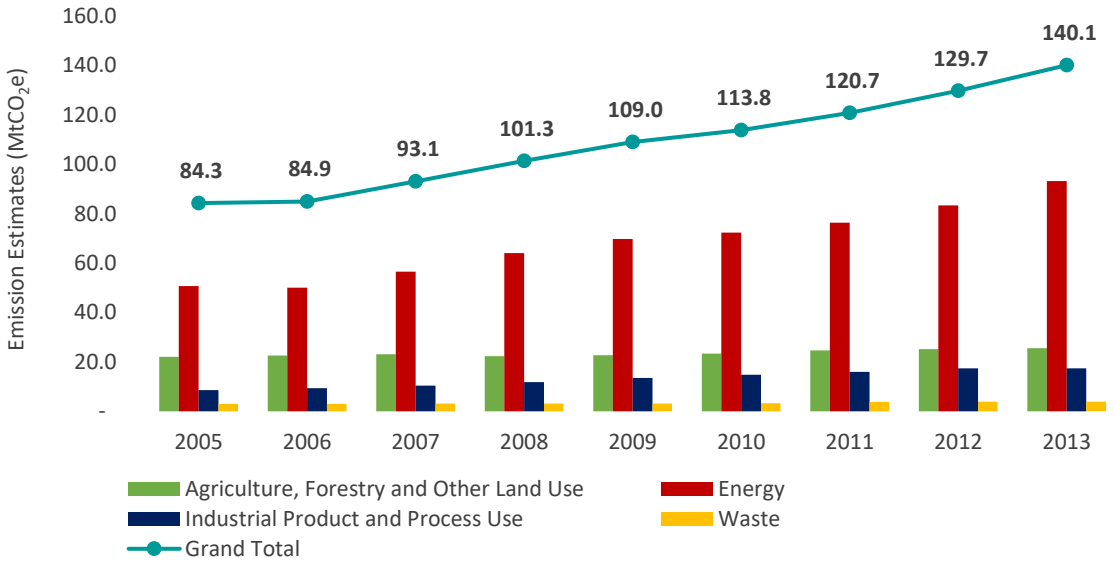
*Fuel combusted for Captive Electricity Generation (Auto-Producers) has been reported under Energy sector.

Rajasthan at a glance (2013)



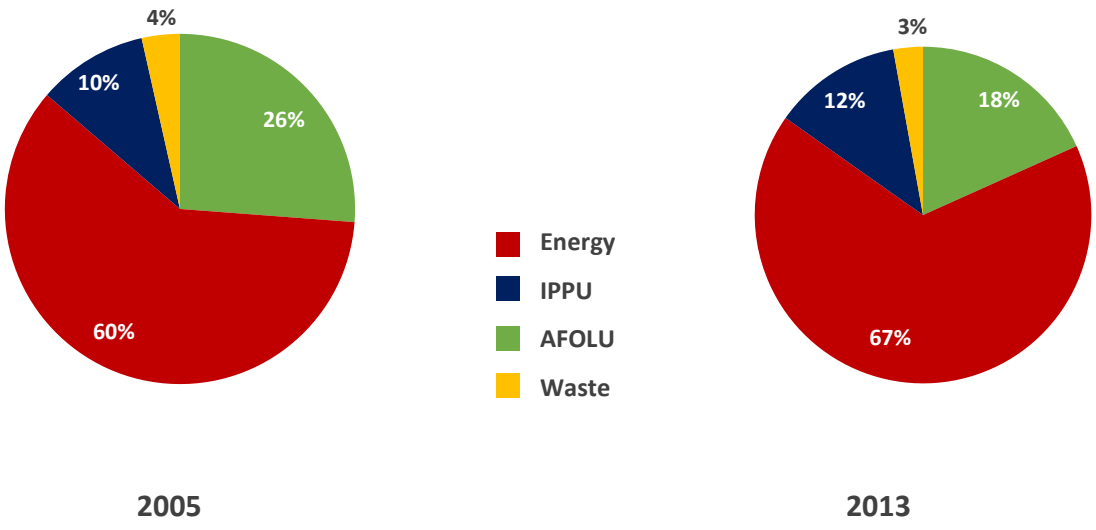
Economy-wide Emission Estimates

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



Emissions from Rajasthan grew at a CAGR[1] of 6.56% from 84.3 $MtCO_2e$ in 2005 to 140.1 $MtCO_2e$ in 2013[2] as depicted in Figure 1 above. The Energy sector was a major contributor of GHG emissions in Rajasthan's total emissions across all the reference years. The share of emissions from the Energy sector rose from ~60% in 2005 to ~67% in 2013, while the share of emissions from the AFOLU sector, the second biggest emitter of GHGs from Rajasthan, declined from ~26% in 2005 to ~18% in 2013 as depicted in Figure 2 below.

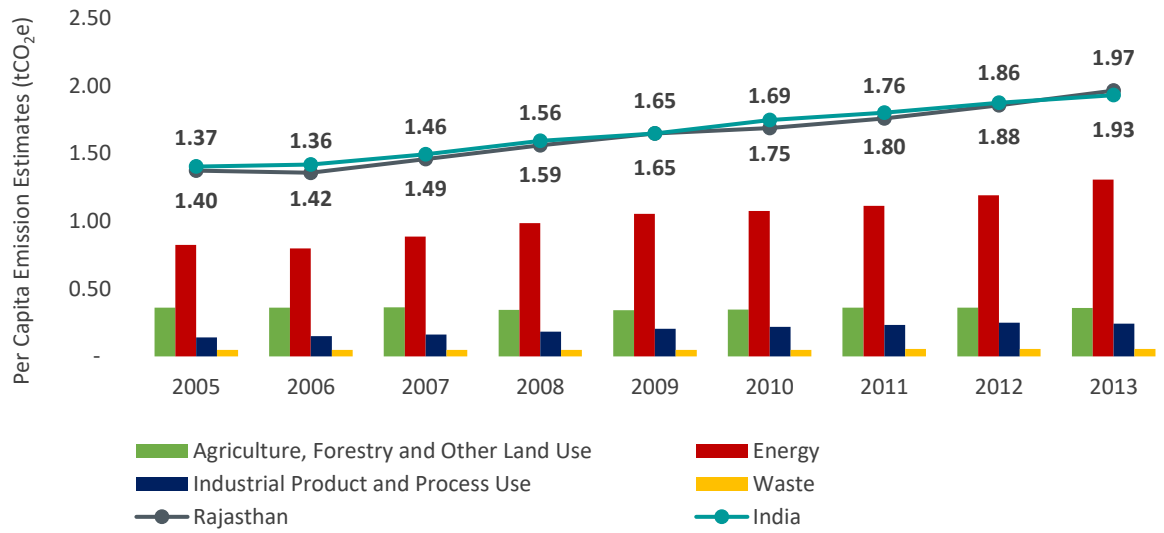
Figure 2: Sector-wise Contribution to Economy-wide GHG Emissions of Rajasthan



[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.

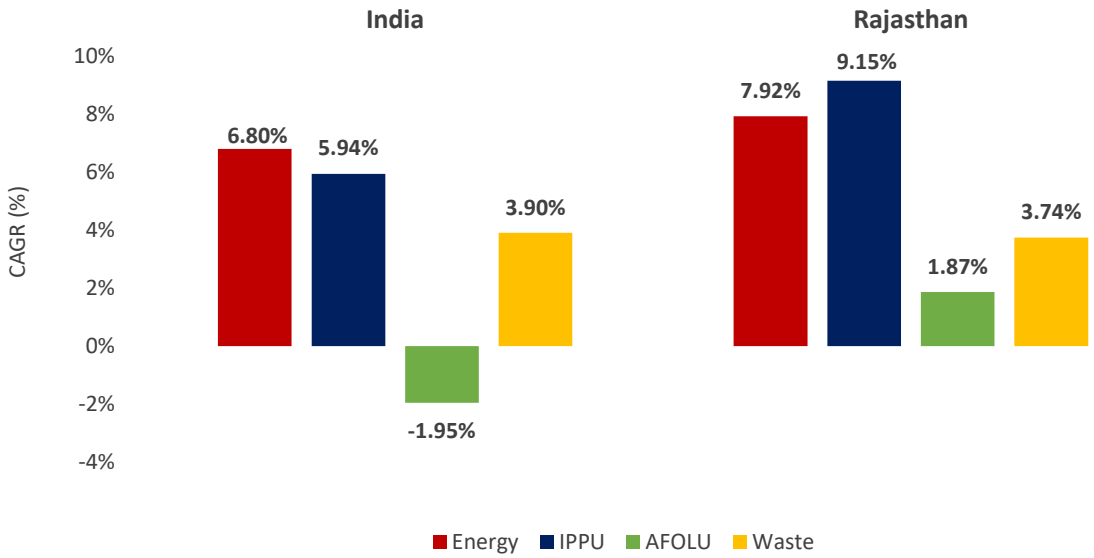
Figure 3: Per Capita GHG Emissions for Rajasthan and India (2005 to 2013)



The per capita emissions of Rajasthan between 2005 and 2013 were almost the same as that of India across all the reference years as represented in Figure 3 above. The observed growth rate of per capita emissions in Rajasthan was 4.58% (CAGR) from 2005 to 2013, slightly higher than India's CAGR of 4.07% for the same period.

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

These growth rates have been compounded annually.

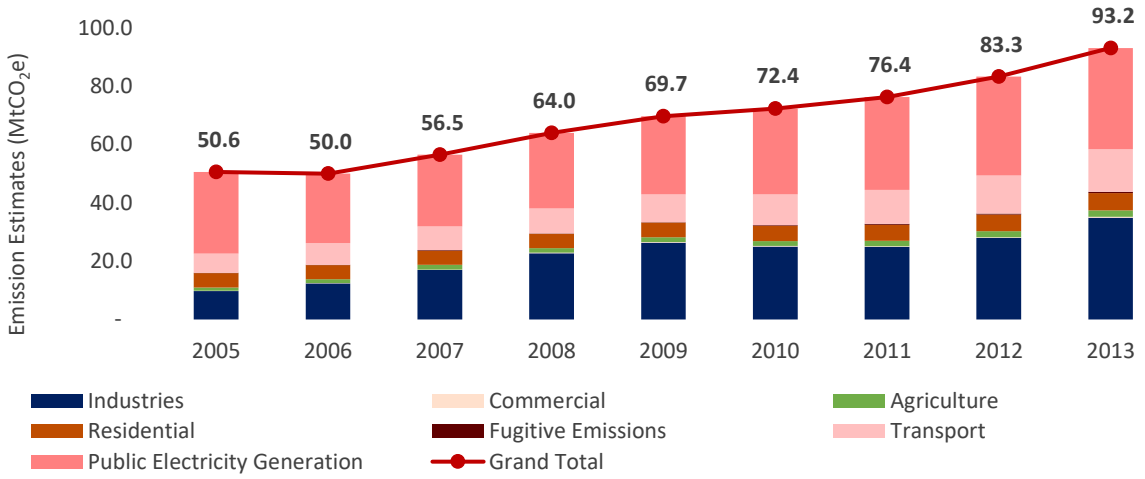


GHG emissions from the IPPU sector of Rajasthan recorded the highest growth rate of 9.15% from 2005 to 2013 amongst all the sectors. This was followed by the Energy sector which recorded a slightly lower growth rate of 7.92% followed by the Waste and AFOLU sectors with an observed CAGR of 3.74% and 1.87% respectively, from 2005 to 2013.

Energy Sector

The Energy sector represented ~67% of the total emissions in Rajasthan in 2013. Emissions from this sector grew at an estimated CAGR of ~7.92% from 50.6 $MtCO_2e$ in 2005 to 93.2 $MtCO_2e$ in 2013 as depicted in Figure 5 below. 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 2013, nearly all the emissions in the state of Rajasthan were due to Fuel Combustion.

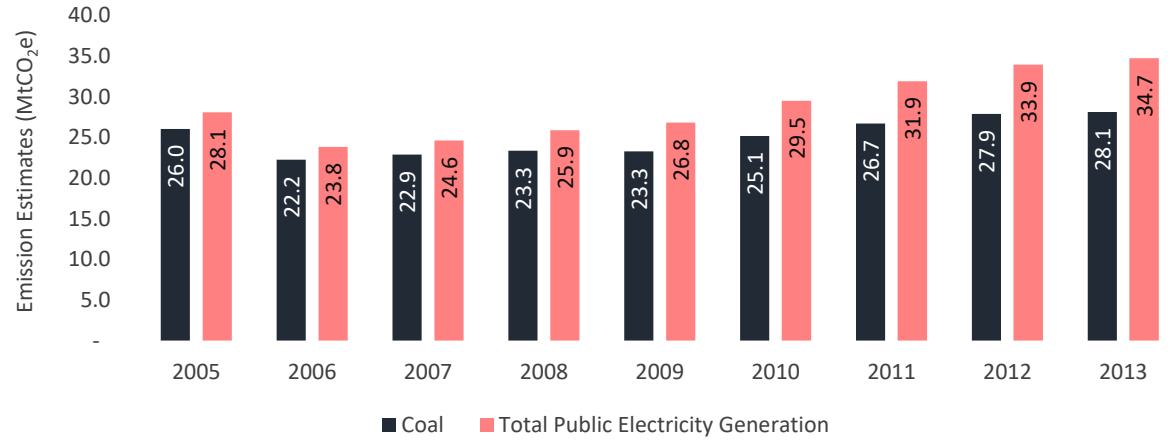
Figure 5: GHG Emission Estimates for Energy Sector in Rajasthan (2005 to 2013)



Emissions due to Combustion of Fuel in the Industries (~38%) formed the major share of emissions in the Energy sector in 2013. Under the Industries category, maximum emissions were observed from Auto-Producer Power Plants in 2013 with its share being close to 53% of the total Fuel Combusted in Industrial emissions. Notably, till 2012, Public Electricity Generation was the highest GHG emitter in the Energy sector with an average share of ~43% from 2005 to 2012.

Deep diving into the Public Electricity Generation category it was observed that majority of the emissions in this category arose due to the burning of Coal in the Thermal power plant across all the years in consideration as illustrated in Figure 6 below. However, the share of emissions from Coal-based Power Generation in this category decreased from ~93% in 2005 to ~81% in 2013. This was mainly due to considerable emissions from Lignite (~12%) and Natural Gas (~7%) in 2013.

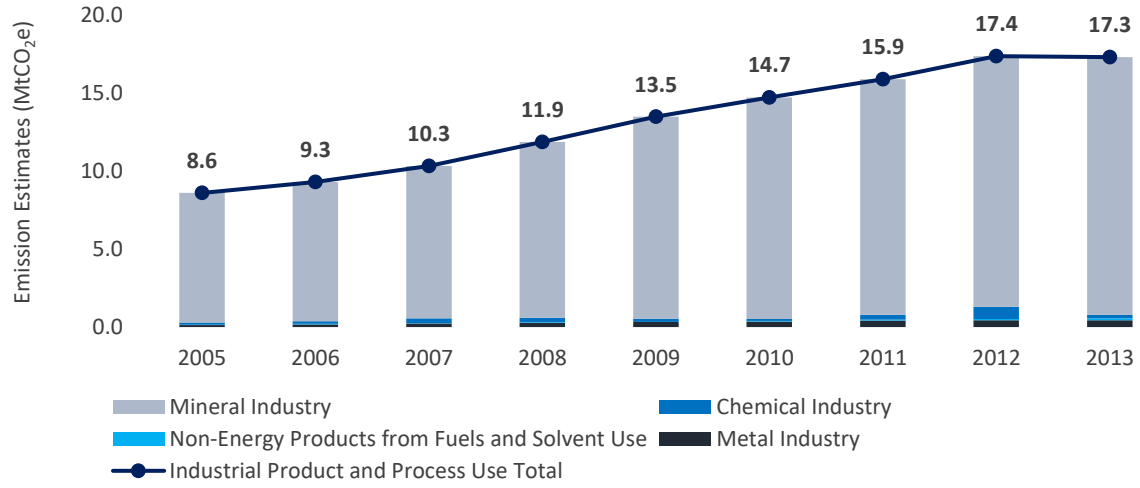
Figure 6: GHG Emission Estimates from Coal-based Power Generation (2005 to 2013)



IPPU Sector

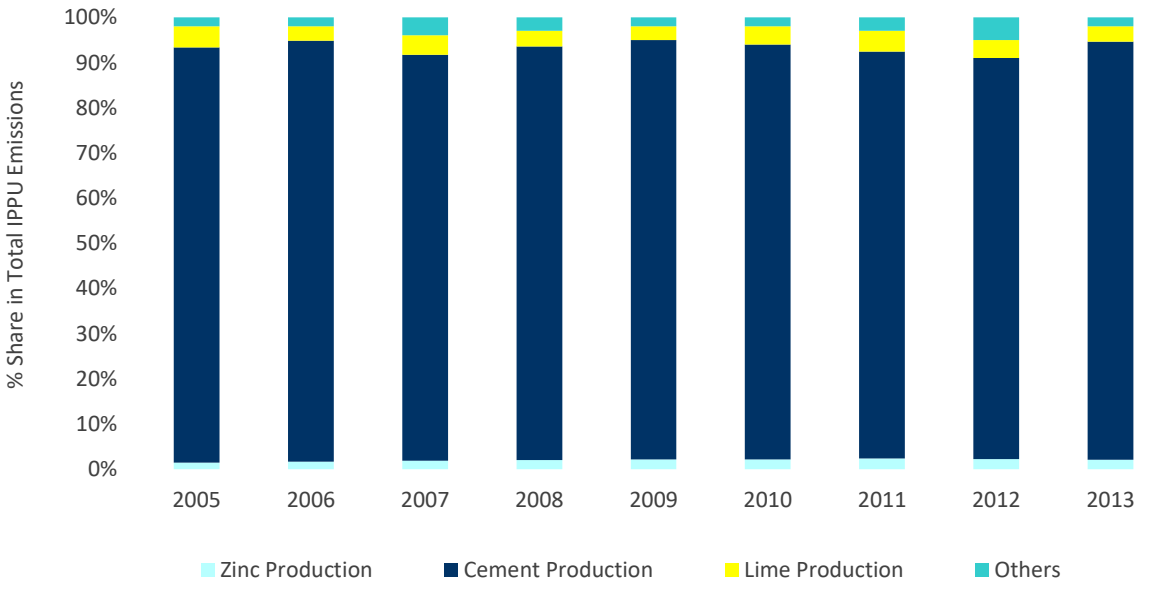
The IPPU sector represented ~12% of the total GHG emissions in Rajasthan in 2013. Between 2005 to 2013, the overall IPPU emissions increased at a CAGR of 9.15% from 8.6 $MtCO_2e$ in 2005 to 17.3 $MtCO_2e$ in 2013. Emissions from the IPPU sector of the state were primarily driven by emissions from the Mineral Industries. Emissions from this category grew at a CAGR of 8.98% from 8.3 $MtCO_2e$ in 2005 to 16.6 $MtCO_2e$ in 2013.

Figure 7: GHG Emission Estimates for IPPU Sector in Rajasthan (2005 to 2013)



A detailed trend of GHG emissions by various IPPU categories is depicted in Figure 8 below. Cement Production was the key driver of GHG emissions with an average share of ~91% in the total IPPU emissions across all the reference years. Emissions were also observed from Lime and Zinc Production with an average share of ~4% and ~2% respectively during the years in consideration.

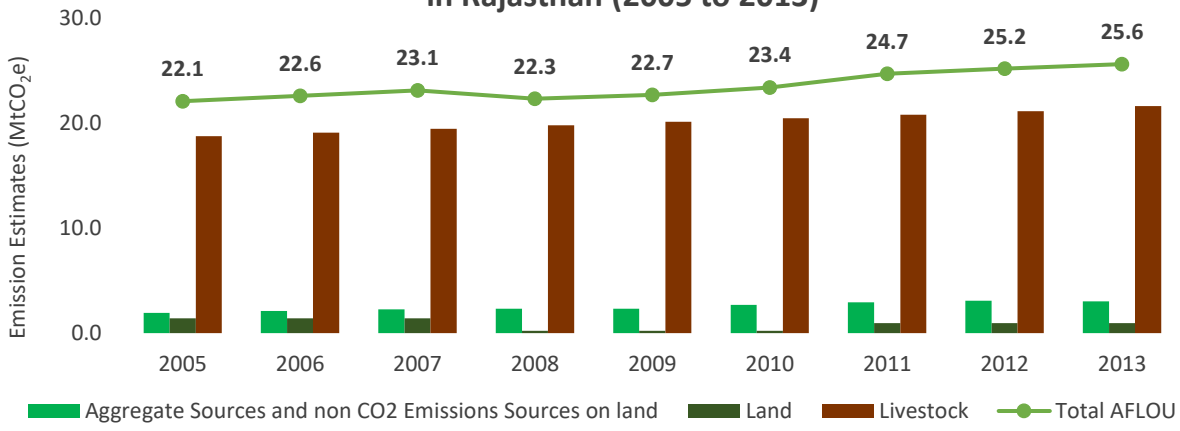
Figure 8: Share of GHG Emissions from IPPU Categories (2005 to 2013)



AFOLU Sector

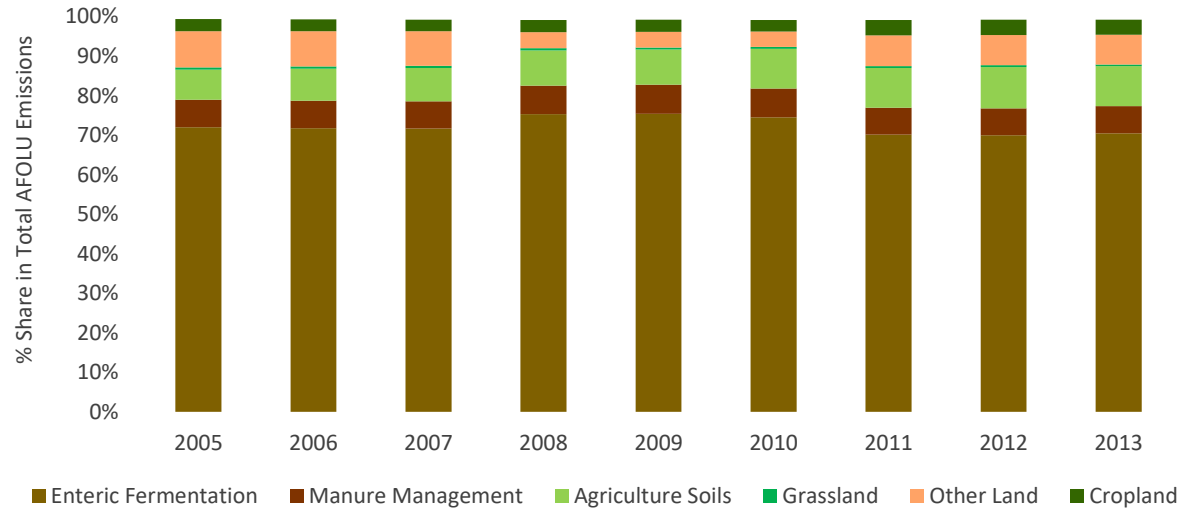
The AFOLU sector represented ~18% of the total emissions in Rajasthan in 2013. Emissions from the AFOLU sector arise from three main sub-sectors namely Livestock, Land and Aggregate Sources and Non-CO_2 Emissions Sources on Land. Emissions from this sector grew at a CAGR of ~1.87% from 22.1 $MtCO_2e$ in 2005 to 25.6 $MtCO_2e$ in 2013. An interim dip was observed in 2008 owing to a decline in the emissions of the Land sub-sector as depicted in Figure 9 below. Livestock was the major contributor of GHG emissions during the reference years and these emissions increased at a compounded rate of 1.80% from 18.7 $MtCO_2e$ in 2005 to 21.6 $MtCO_2e$ in 2013.

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



Deep diving into various AFOLU categories, it was observed that Enteric Fermentation was the major emitter of GHGs in this sector for all reference years. Notably, the share of emissions from Enteric Fermentation in the total AFOLU emissions declined from ~72% in 2005 to 70% in 2013 as illustrated in Figure 10 below. However, an increase in the share of emissions from Agricultural Soils was observed from ~8% in 2005 to ~10% in 2013 which was perhaps a reflection of increased usage of fertilizers in crop production.

Figure 10: Share of GHG Emissions from AFOLU Sub-sectors (2005 to 2013)



Waste Sector

The Waste sector contributed to almost 3% of total emissions of Rajasthan in 2013. Municipal Solid Waste[3], 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 3.74% from 2.96 $MtCO_2e$ in 2005 to 3.98 $MtCO_2e$ in 2013. As depicted in Figure 12 below, a sudden increase in the overall emissions of the Waste sector was observed in 2011 due to increased emissions from the Domestic Wastewater of Rajasthan which reflects changing trends in use of various treatment systems as reported in Census of India 2011.

Figure 11: Category-wise Share of GHG Emissions for Waste Sector (in 2013)

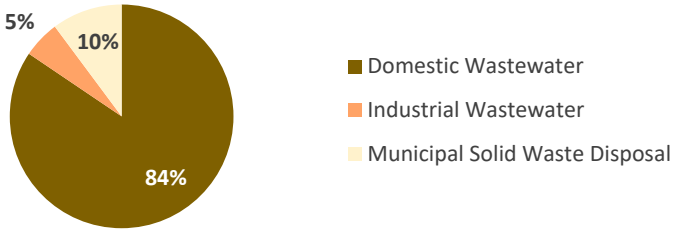
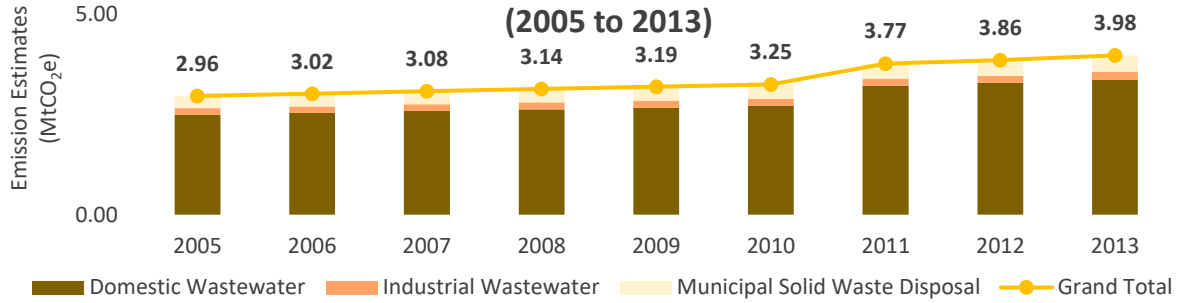
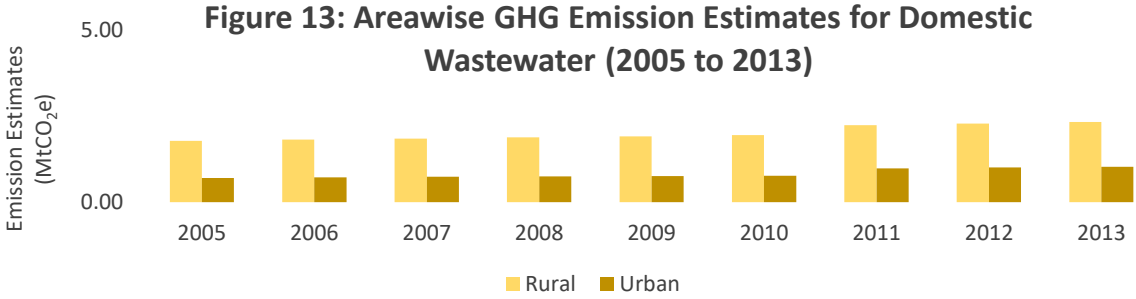


Figure 12: GHG Emission Estimates for Waste Sector in Rajasthan (2005 to 2013)



Domestic Wastewater had a share of ~84% in the total emissions of the Waste sector in 2013. Emissions from Domestic Wastewater of Rajasthan grew at a CAGR of 3.82% from 2.49 $MtCO_2e$ in 2005 to 3.36 $MtCO_2e$ in 2013. As shown in Figure 13 below, the majority of the Domestic Wastewater emissions originated from the rural areas of Rajasthan with a share of ~69% in 2013. Discharge of untreated wastewater and use of septic tanks are key drivers of emissions in this sub-sector.

Figure 13: Areawise GHG Emission Estimates for Domestic Wastewater (2005 to 2013)



Municipal Solid Waste Disposal represented ~10% of the total Waste sector emissions in 2013. The emissions from this sub-sector grew at an estimated CAGR of 3.57% from 0.31 $MtCO_2e$ in 2005 to 0.40 $MtCO_2e$ in 2013.

Industrial Wastewater comprised ~5% of total Waste sector emissions in 2013. Emissions from this sub-sector grew at a rate of 2.77% (compounded annually) from 0.17 $MtCo_2e$ in 2005 to 0.21 MtCO2e in 2013. Approximately 50% of the emissions of this sub-sector were due to the Pulp and Paper Industries while the remaining ~50% were the combined emissions of Dairy (~22%), Meat (~16%), Fertilizers (~12%) and Tannery Industries (~1%) 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 CH_4 emissions

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The Platform comprises of the following civil society:

An initiative supported by

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