

Trend Analysis of GHG Emissions in HARYANA

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*



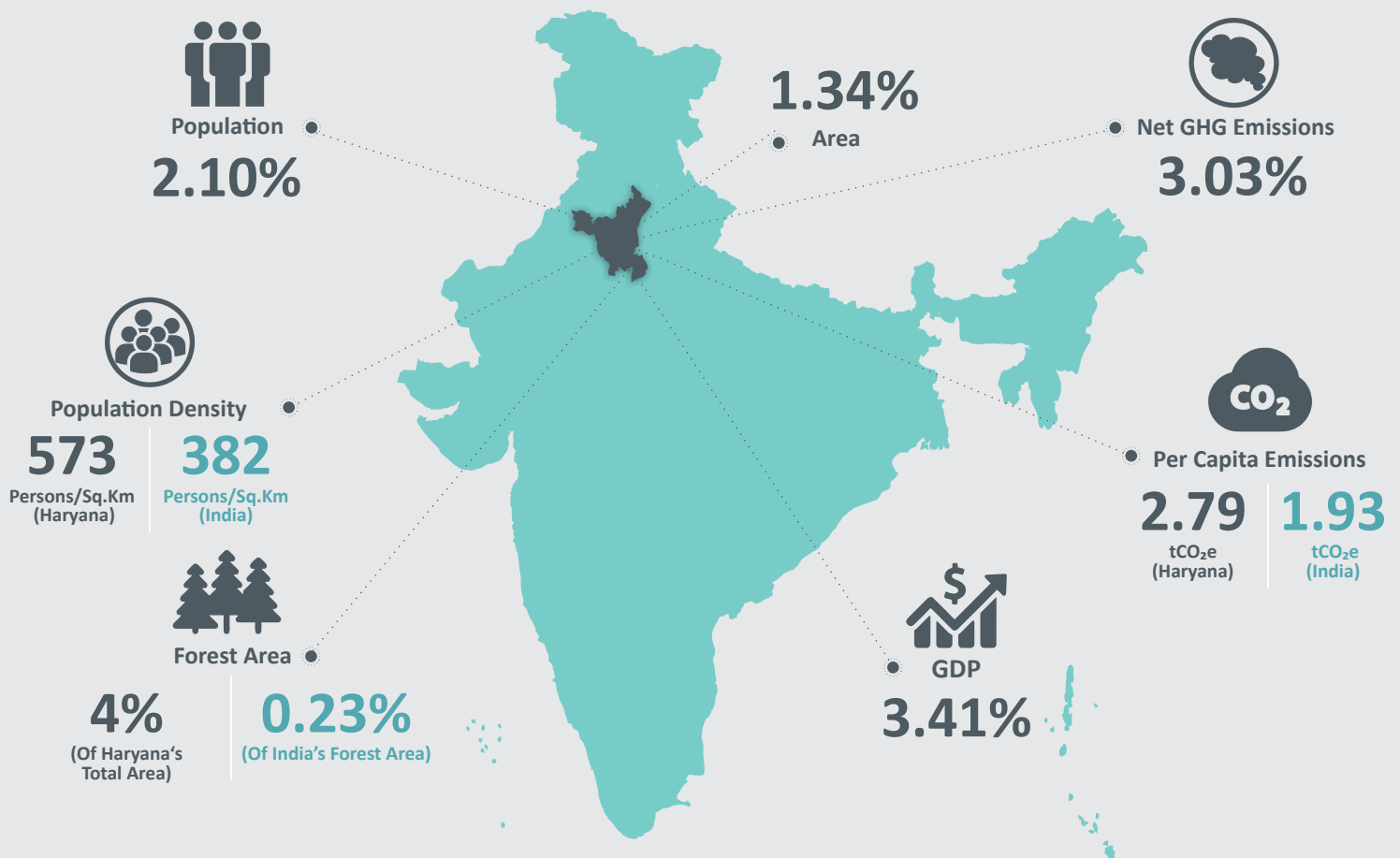
AFOLU



WASTE

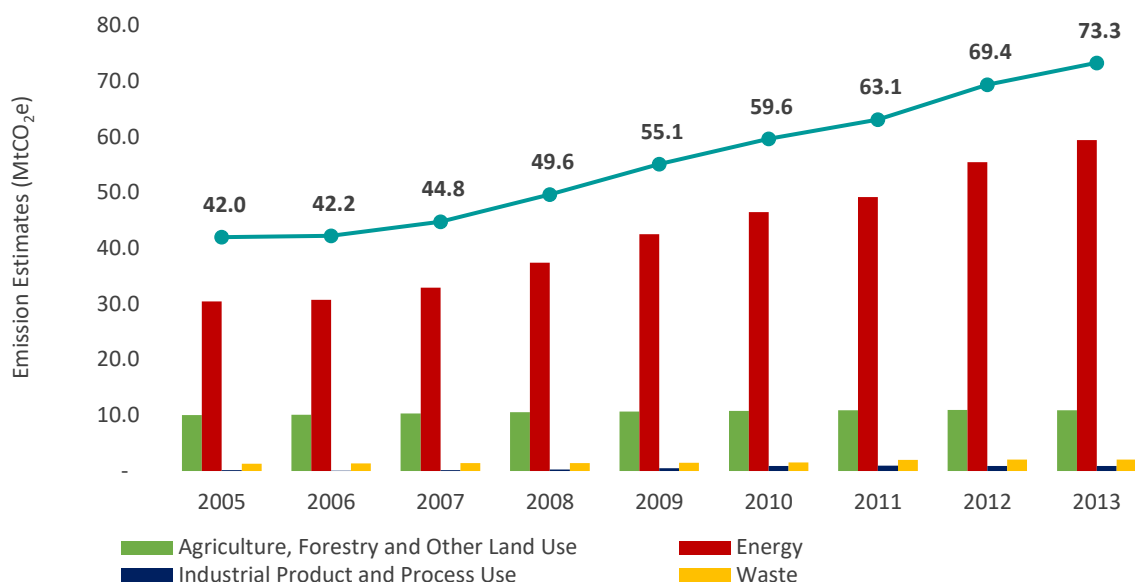
*Fuel combusted for Captive Electricity Generation (Auto-Producers) has been reported under Energy sector.

Haryana at a glance (2013)



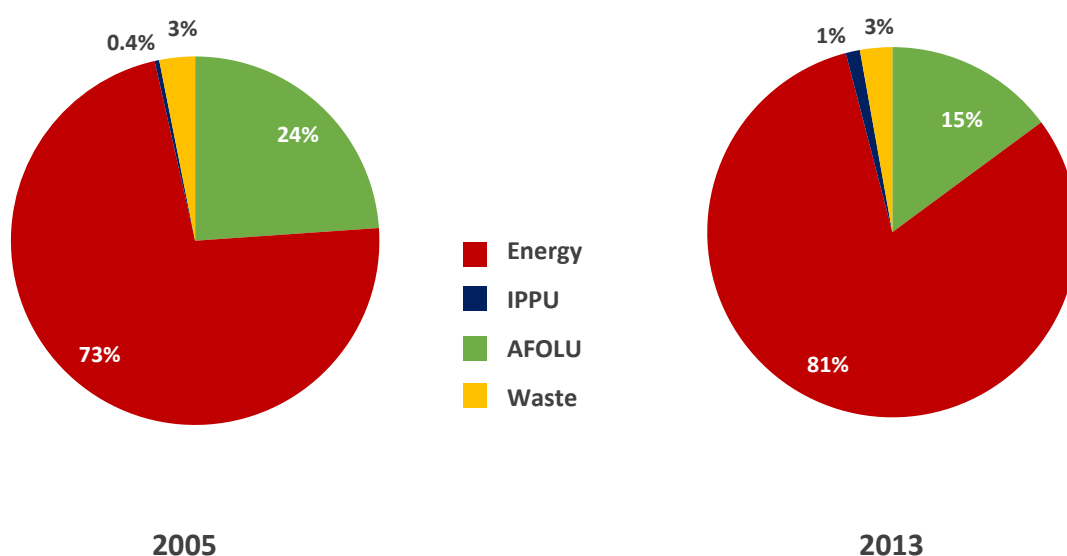
Economy-wide Emission Estimates

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



Emissions of Haryana grew at a CAGR¹ of 7.21% from 42.0 MtCO₂e in 2005 to 73.3 MtCO₂e in 2013² as depicted in Figure 1 above. Maximum emissions were registered from the Energy and AFOLU sectors in this state during all the reference years. As inferred from Figure 2 below, the share of GHG Emissions from the Energy sector increased from ~73% in 2005 to ~81% in 2013 while those of the AFOLU sector decreased from ~24% in 2005 to ~15% in 2013. However, the share of Waste and IPPU sectors remained almost the same from 2005 to 2013.

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



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.

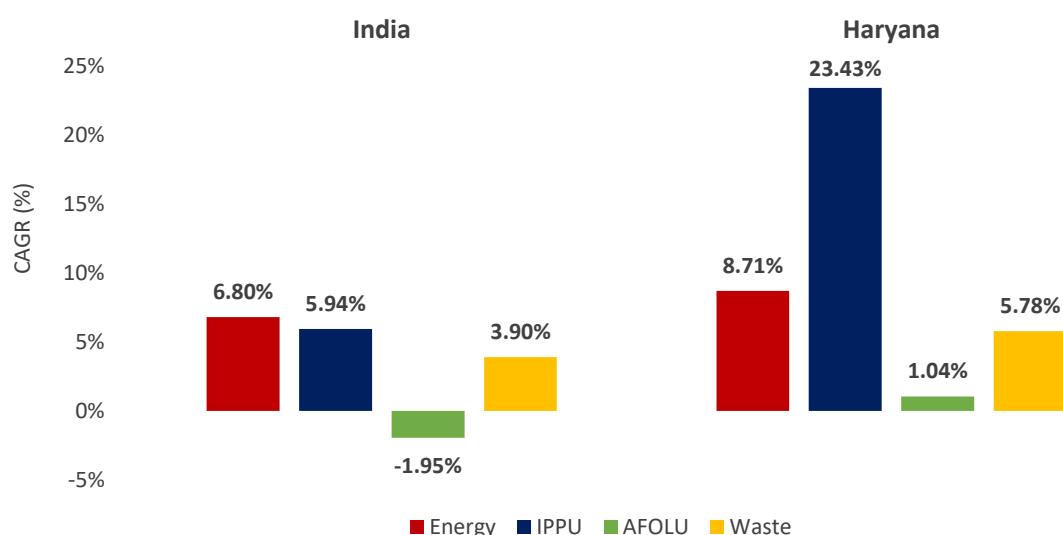
Figure 3: Per capita GHG Emissions for Haryana and India (2005 to 2013)



The per capita emissions of Haryana grew from 1.84 tCO₂e in 2005 to 2.79 tCO₂e in 2013 as depicted in Figure 3 above. When compared to India, per capita emissions of Haryana were higher than that of the country during all the years in consideration. The observed CAGR of Haryana and India from 2005 to 2013 were 5.34% and 4.07% respectively.

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

These growth rates have been compounded annually.



In Haryana, the IPPU sector recorded the highest CAGR of 23.43%³ from 2005 to 2013. This was followed by the Energy sector which recorded a much lower growth rate of 8.71% followed by the Waste and AFOLU sectors with an observed CAGR of 5.78% and 1.04% respectively from 2005 to 2013. When compared to India's sectoral growth rates of GHG emissions, all sectors of Haryana recorded higher growth rates.

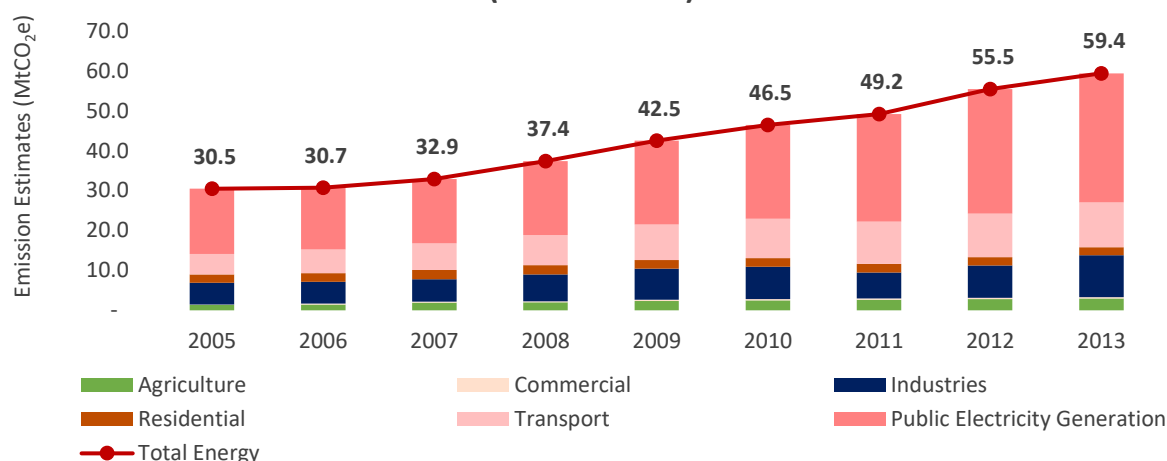
³ The CAGR value is very high but the corresponding change in absolute emissions was only of the order of 0.74 MtCO₂e.



Energy Sector

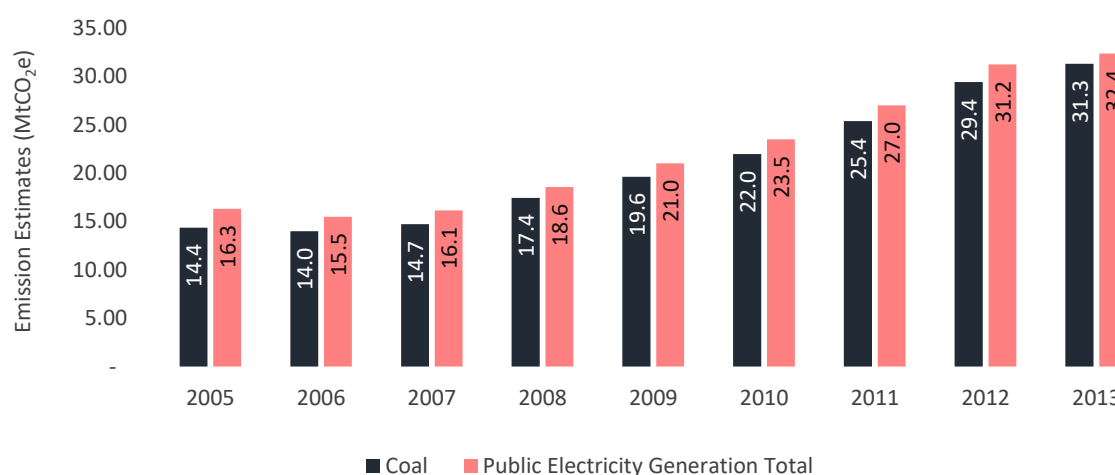
The Energy sector represented ~81% of the total emissions of Haryana in 2013. Emissions from this sector grew at an estimated CAGR of 8.71% from 30.5 MtCO₂e in 2005 to 59.4 MtCO₂e in 2013 (Figure 5). In general, emissions from the Energy sector arise from two main sub-sectors – Fuel Combustion (Public Electricity Generation, Transport, Industries and Agriculture, Commercial and Residential categories) and Fugitive. In Haryana, emissions were registered only from Fuel Combustion and no emissions were observed from the Fugitive sub-sector.

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



On further investigation of the Energy sub-sectors, it was observed that in 2013, Public Electricity Generation (~54%), Transport (~19%) and Industries (~18%) were the top three GHG emitters of this sector. Emissions due to Public Electricity Generation grew at an estimated CAGR of 8.94% from 16.3 MtCO₂e in 2005 to 32.4 MtCO₂e in 2013. Deep diving into Public Electricity Generation, it was observed that majority of the emissions of this category were due to the burning of Coal in the Thermal Power Plants across all the reference years as illustrated in Figure 6 below. Notably, the share of emissions from Coal-based Power Plants in the total emissions of this category increased from ~88% in 2005 to almost 97% in 2013. Some significant emissions were also observed from Naphtha and Natural gas in this category during the reference period.

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

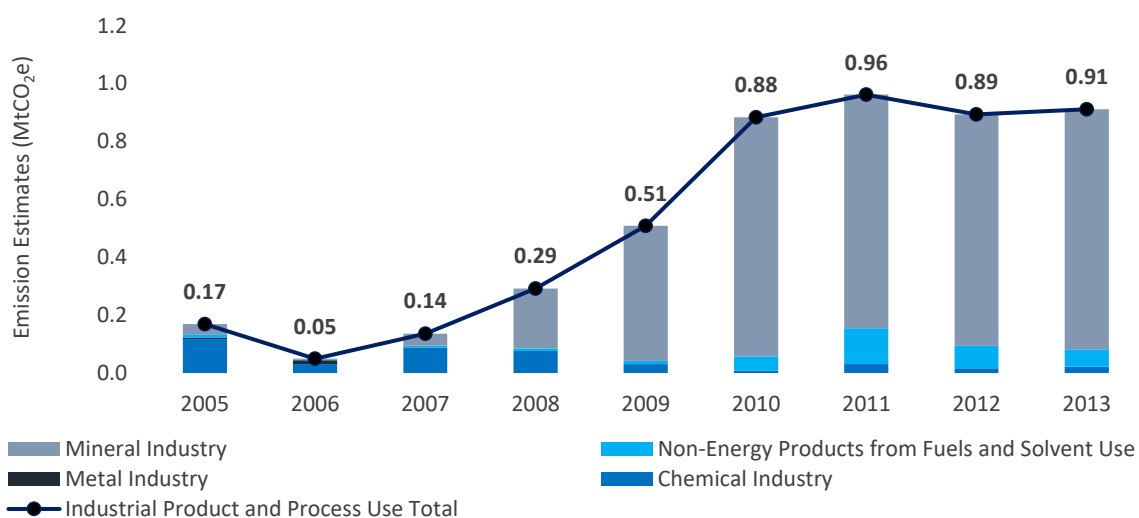




IPPU Sector

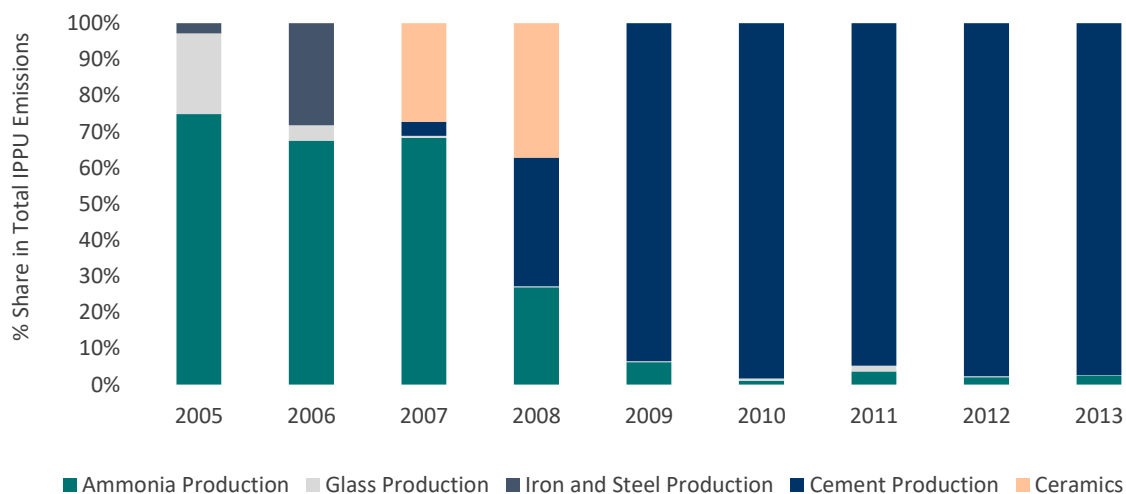
The IPPU sector represented ~1% of the total GHG emissions in Haryana in 2013. Emissions from the IPPU sector are largely driven by Chemical, Metal, Mineral Industries and Non-Energy Products from Fuels and Solvent Use. Between 2005 and 2013, overall IPPU emissions grew at a CAGR of 23.43%⁴ from 0.17 MtCO₂e in 2005 to 0.91 MtCO₂e in 2013. The pronounced growth in the IPPU emissions was a result of increasing Cement Production during 2006 to 2011 (Figure 7).

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



A detailed trend of GHG emissions by various IPPU categories is illustrated in Figure 8 below. It can be seen that during the initial years (Between 2005 to 2007), Ammonia Production was the major contributor of emissions among all the categories. The emissions from this category declined at a rate of 18.82% from 0.12 MtCO₂e in 2005 to 0.02 MtCO₂e in 2013. Cement Production was found to be the key driver of emissions from 2009 onwards and had an approximate share of ~91% in the year 2013.

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



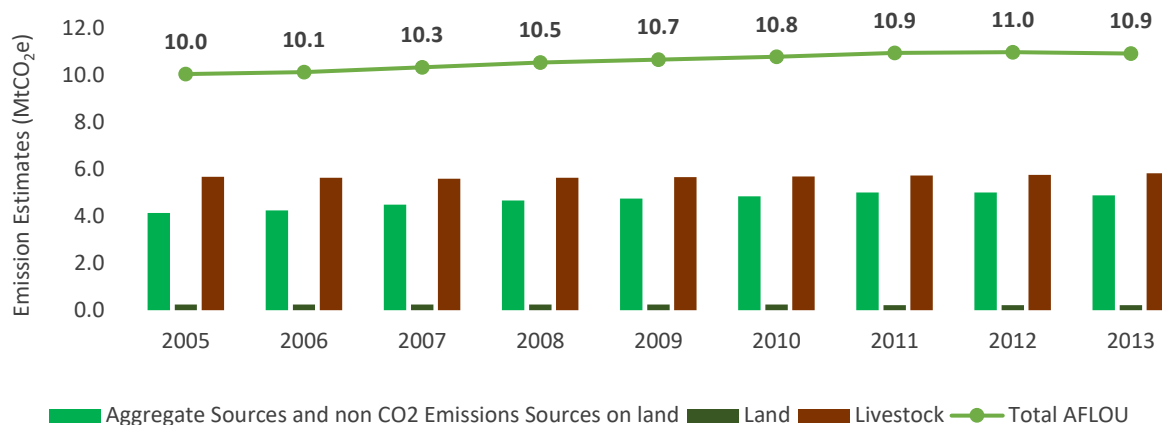
⁴ The CAGR value is very high but the corresponding change in absolute emissions was only of the order of 0.74 MtCO₂e.



AFOLU Sector

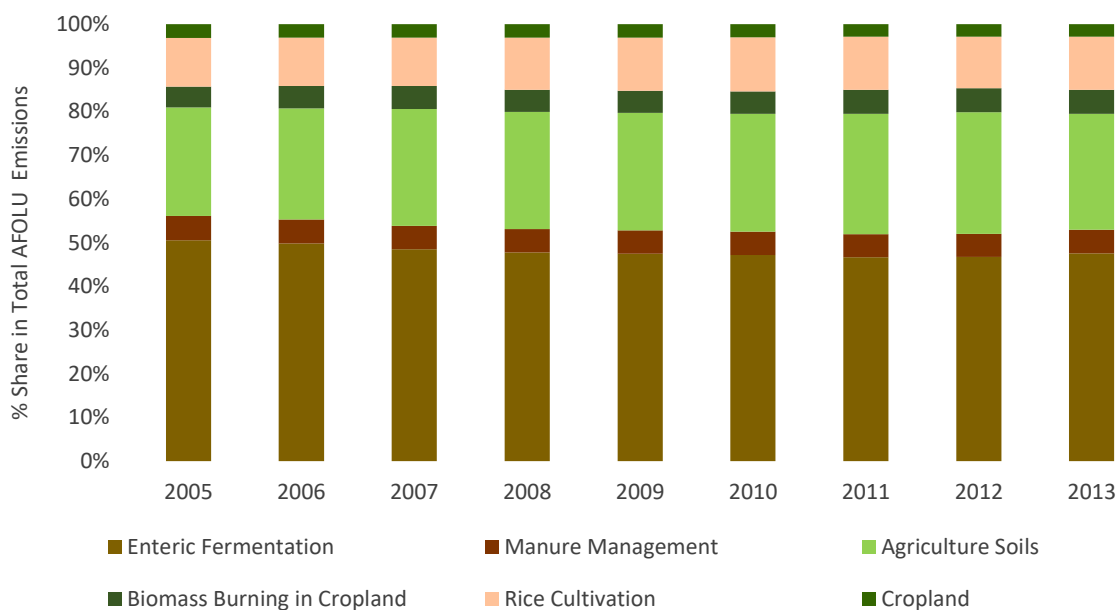
The AFOLU sector represented ~15% of the total emissions in Haryana in 2013. Emissions from AFOLU sector arise from three main sub-sectors namely Livestock, Land and Aggregate sources and Non-CO₂ Emissions Sources on Land. Emissions from the AFOLU sector grew at a low CAGR of 1.04% from 10.0 MtCO₂e in 2005 to 10.9 MtCO₂e in 2013 as depicted in Figure 9 below.

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



Maximum emissions in the AFOLU sector occurred due to Enteric Fermentation with an average share of ~48% across all the years. The share of emissions from other categories remained almost stable indicating a flattening of emissions during the reference period as illustrated in Figure 10 below.

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





Waste Sector

The Waste sector contributed to almost 3% of the total emissions in Haryana in 2013. Municipal Solid Waste⁵, 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 5.78% from 1.31 MtCO₂e in 2005 to 2.06 MtCO₂e in 2013 (Figure 11). The 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.

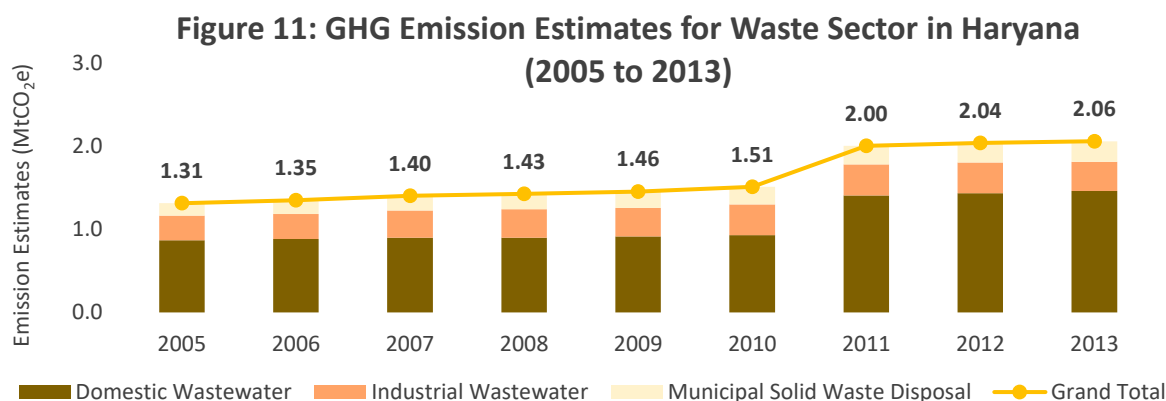
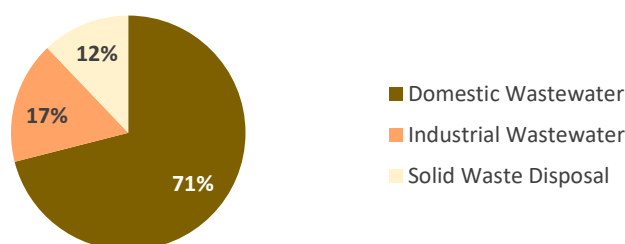


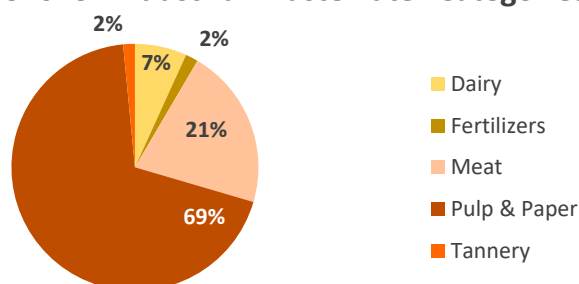
Figure 12: Category-wise Share of GHG Emissions for Waste Sector (in 2013)



Domestic Wastewater had a share of ~71% in the total emissions of the Waste sector in 2013. In Haryana, emissions from Domestic Wastewater grew at a CAGR of 6.76% from 0.87 MtCO₂e in 2005 to 1.46 MtCO₂e in 2013. Rural areas of Haryana were the major contributor of emissions from this sub-sector across all the reference years with a share of ~62% in 2013. Discharge of untreated wastewater and use of septic tanks are key drivers of emissions in this sub-sector.

Approximately 17% of the total Waste Emissions were due to Industrial Wastewater in 2013. The emissions from this sub-sector grew at a rate of 2.02% (compounded annually) from 0.30 MtCO₂e in 2005 to 0.35 MtCO₂e in 2013. In 2013, Pulp and Paper Waste had a major share of ~69% in this sub-sector followed by Meat (~21%) and Dairy (~7%) Waste while Tannery and Fertilizers Waste contributed ~2% each as shown in Figure 13 below.

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



⁵ 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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