

Trend Analysis of GHG Emissions of 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.

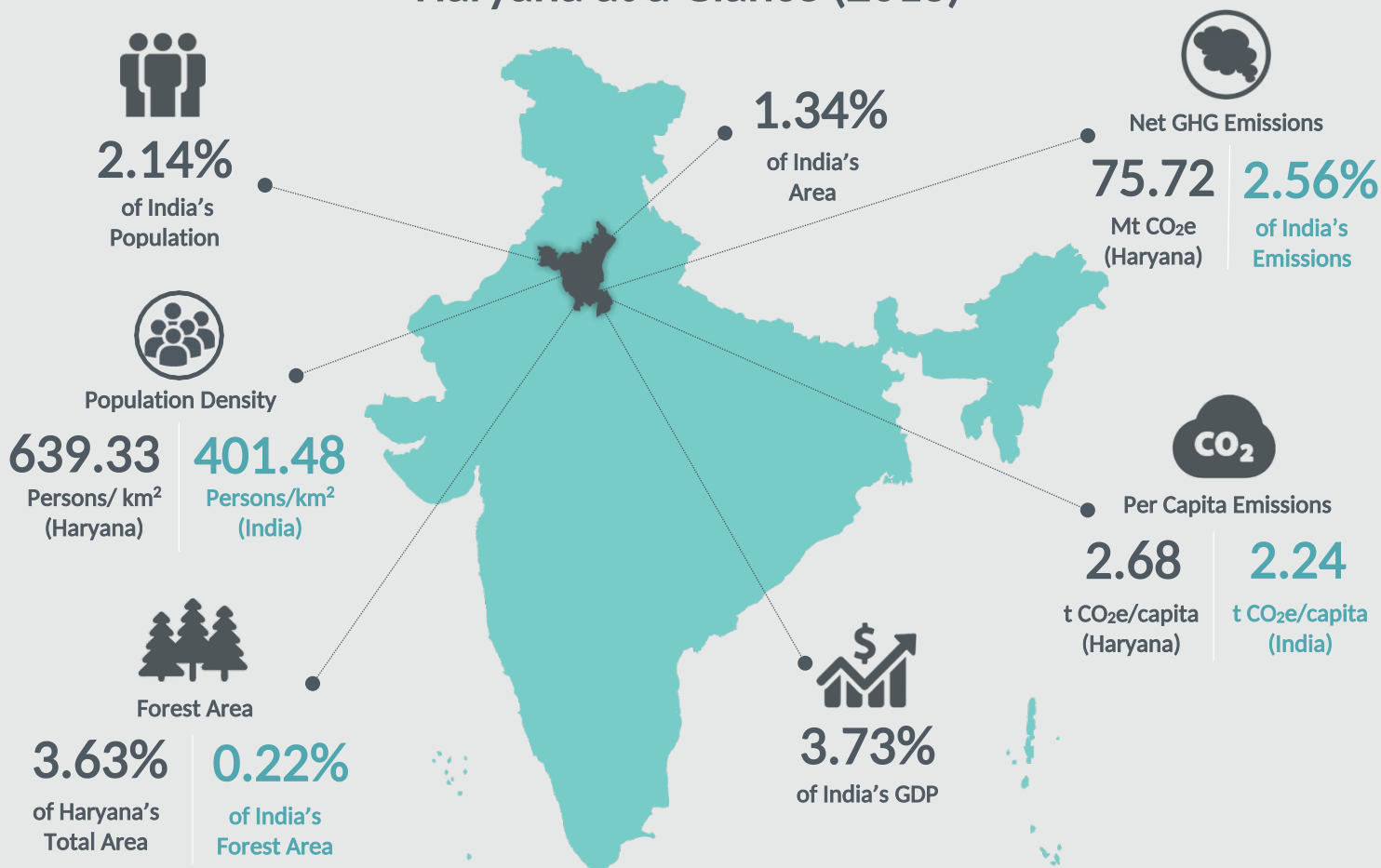
The Platform aims to add value to the various ongoing GHG emissions estimation efforts by addressing existing data gaps and data accessibility issues, broadening the scope of national inventories to include state inventories, and increasing the volume of analytics and policy dialogue on India's GHG emissions sources, profile, and related policies.

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



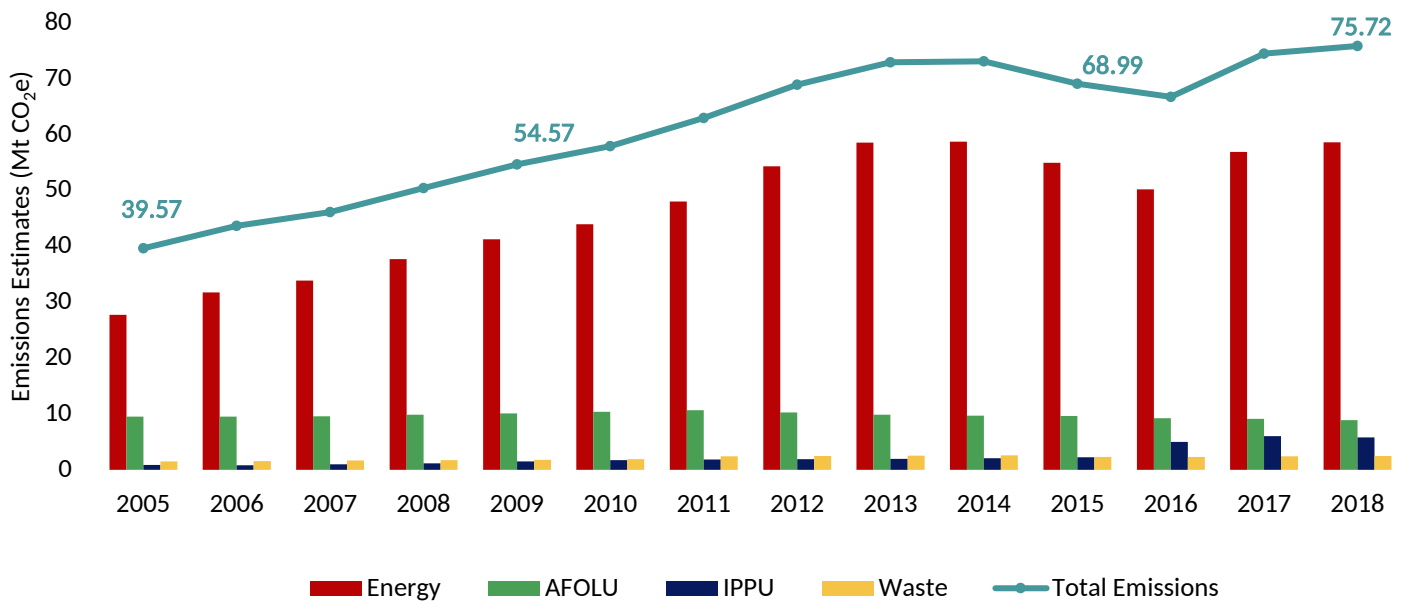
*Fuel combusted for captive electricity generation (auto-producers) and direct fuel combustion (industrial energy) has been reported under Energy sector.

Haryana at a Glance (2018)



Economy-wide Emissions Estimates

Figure 1: GHG Emissions Estimates of Haryana (2005 to 2018)



Emissions of Haryana increased from 39.57 Mt CO₂e in 2005, to 75.72 Mt CO₂e in 2018, at a CAGR of 5.12% (see Figure 1). The decrease in the economy-wide emissions of the state in 2016 can be attributed to the decline in emissions from the Energy sector.

The share of emissions from the Energy sector in economy-wide emissions increased from ~70% in 2005 to ~77% in 2018, while the share of emissions from Industrial Processes and Product Use (IPPU) sector increased from ~2% in 2005 to ~8% in 2018. Whereas, the share of Agriculture, Forestry and Other Land-Use (AFOLU) sector emissions reduced from ~24% in 2005 to ~12% in 2018 and that of Waste sector emissions reduced from ~4% in 2005 to ~3% in 2018 (see Figure 2).

Figure 2: Sector-wise Contribution (Mt CO₂e) and Percentage Share in Total Economy-wide GHG Emissions of Haryana

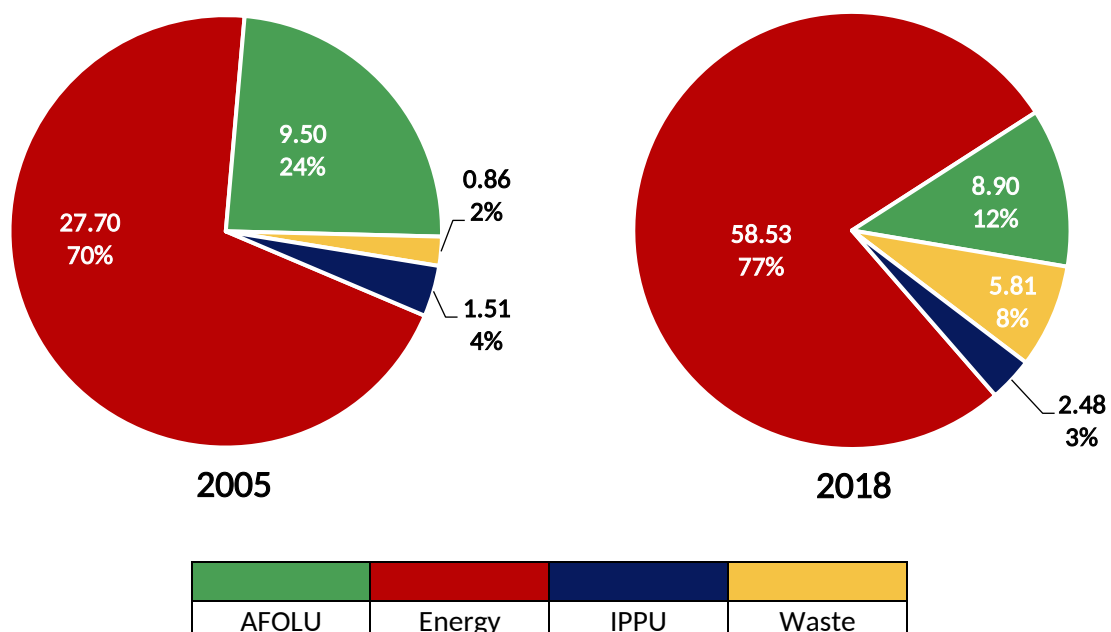
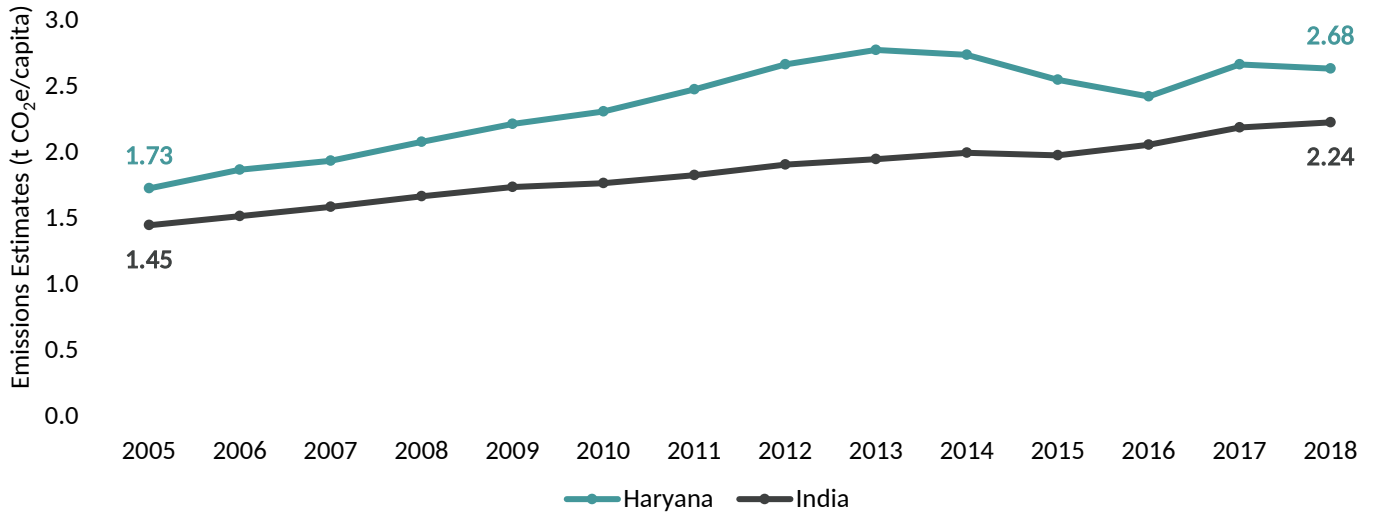


Figure 3: Per Capita GHG Emissions of Haryana and India (2005 to 2018)



The per capita emissions of Haryana were higher than that of India throughout the reference period (see Figure 3). However, they increased at a compounded rate of 3.42% from 1.73 t CO₂e/capita in 2005 to 2.68 t CO₂e/capita in 2018, which was almost equal to India's CAGR (~3.41%).

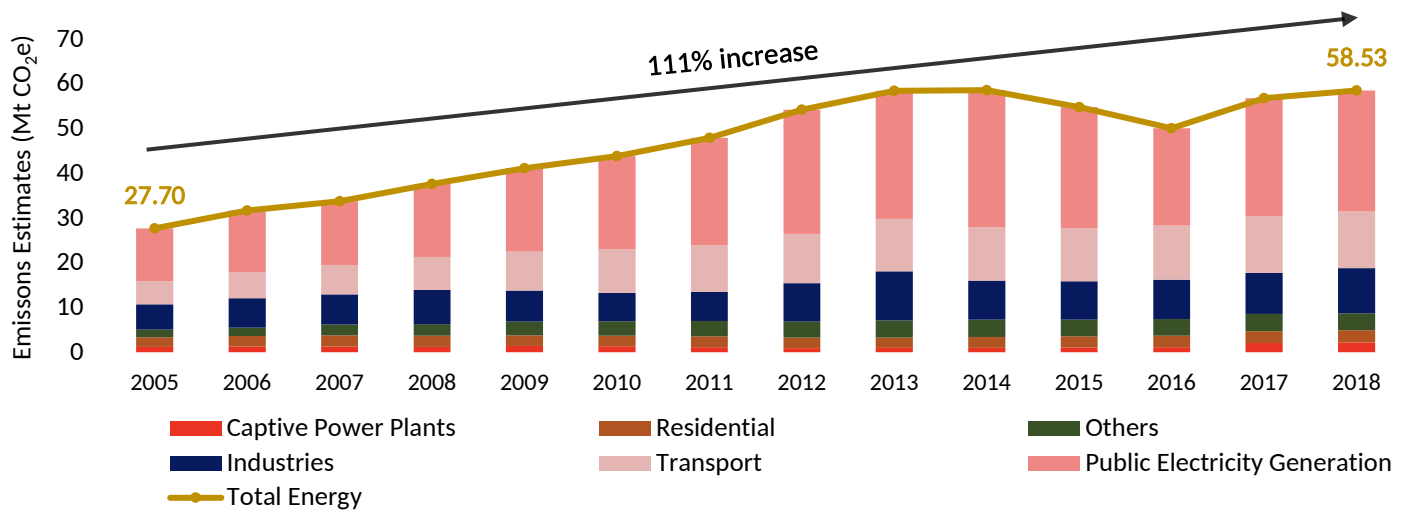
Energy Sector



The Energy sector emissions comprise of emissions from Fuel Combustion and Fugitive Emissions. Fuel Combustion includes emissions from Public Electricity Generation, Transport, Captive Power Plants, Industries, Agriculture, Commercial, and Residential categories. Fugitive Emissions are due to Fuel Production.

The Energy sector of Haryana accounted for ~77% of the total economy-wide emissions in 2018. Emissions from the Energy sector increased at the rate of 5.92% (compounded annually), from 27.70 Mt CO₂e in 2005, to 58.53 Mt CO₂e in 2018 (see Figure 4). Notably, emissions from the Energy sector reduced between 2014 and 2016, due to decline in the emissions from the Public Electricity Generation category, but they began to rise again after 2016.

Figure 4: GHG Emissions Estimates of Energy Sector - Haryana (2005 to 2018)



Within the Energy sector, Public Electricity Generation category, with a share of ~46% of the total Energy emissions, was the major contributor of GHG emissions, in 2018. This was followed by Transport and Industrial Energy categories with shares of 22% and 17%, respectively (see Figure 5).

Within the Fuel Combustion sub-sector, emissions from Coal were the major contributor with the average share being ~49% during the reference period. This was followed by emissions from combustion of Liquid Petroleum Fuels, with an average share of ~39% between 2005 and 2018. Gaseous Petroleum Fuels had an average share of ~11%, while Other Fuels contributed ~1% to the Fuel Combustion emissions during the reference period (see Figure 6).

Figure 5: Category-wise Emissions (Mt CO₂e) and Percentage Share in Total Energy Sector Emissions (2018)

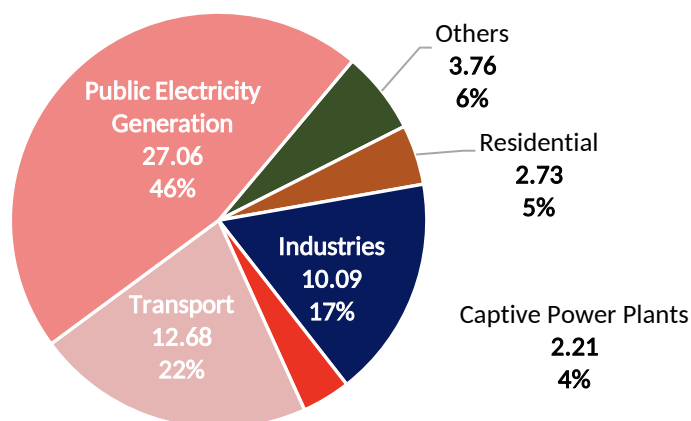
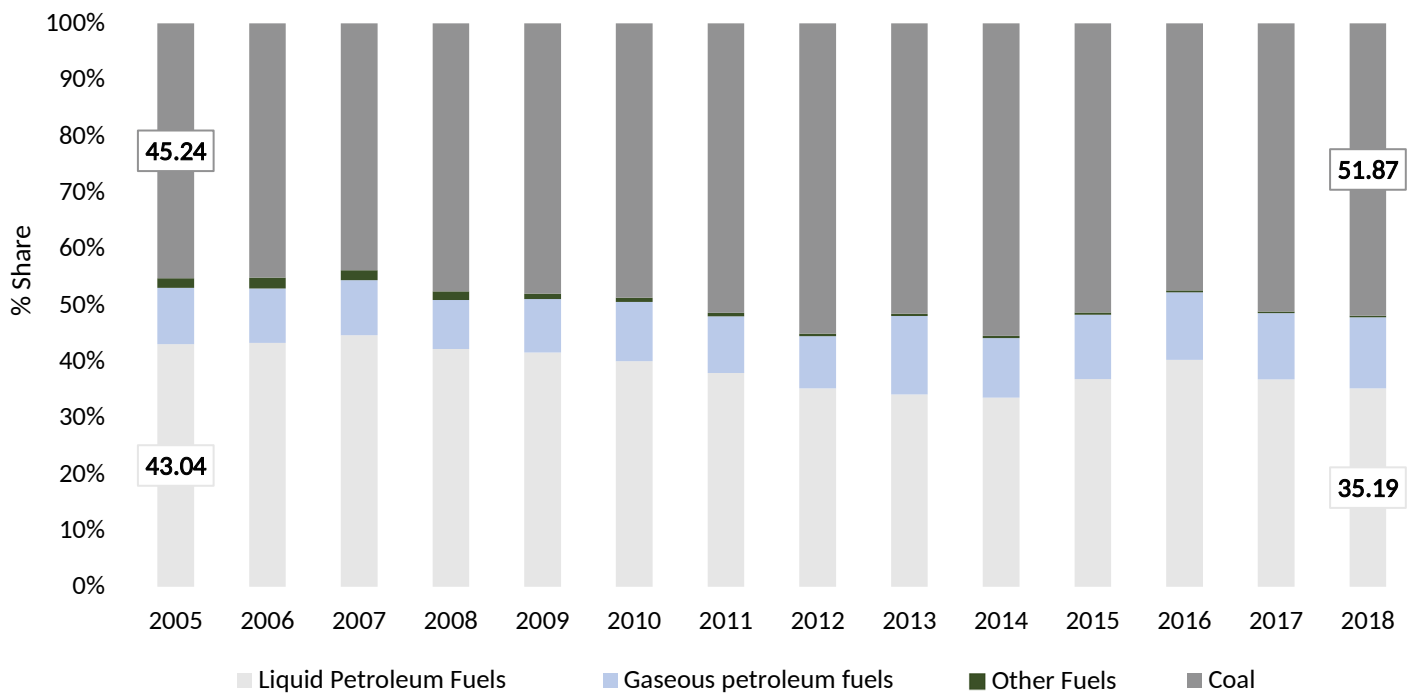


Figure 6: Percentage Share of GHG Emissions by Fuel Type due to Fuel Combustion in Energy Sector (2005 to 2018)*



***Notes:**

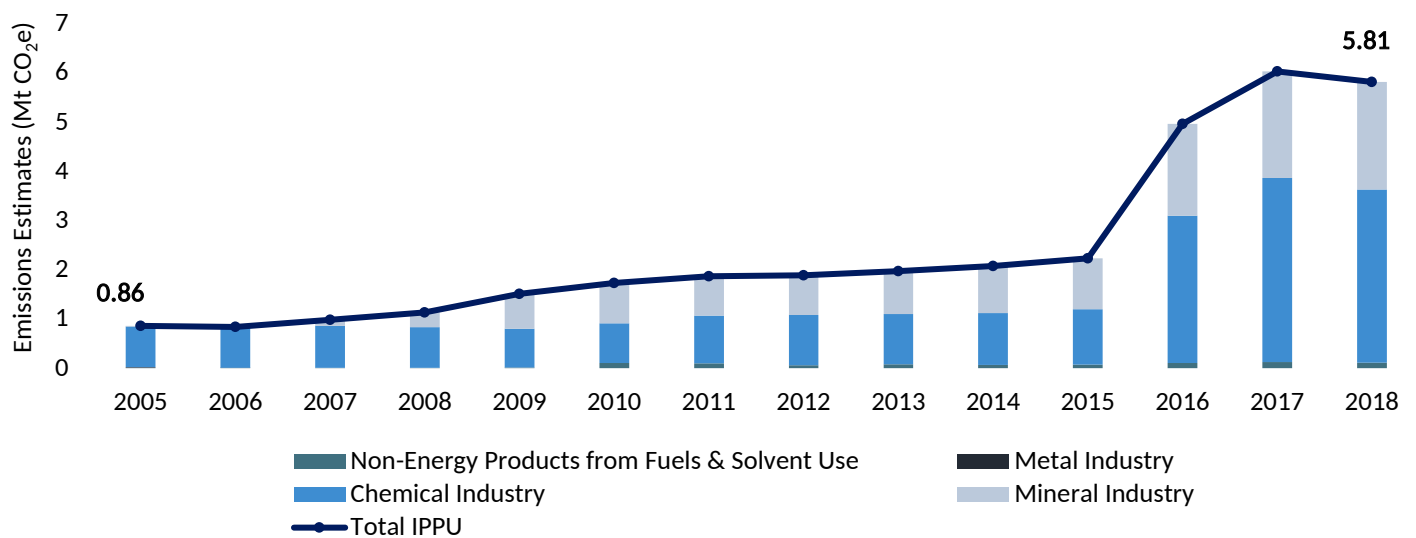
1. Coke is included in Coal because the bifurcation of pet-coke and coke was not available
2. Gaseous Fuels - natural gas, LPG and other gaseous fuels
3. Liquid Petroleum Fuels - ATF, diesel, kerosene, motor spirit and other liquid fuels
4. Other Fuels comprises of firewood and charcoal



IPPU Sector

Emissions from the Industrial Processes and Product Use (IPPU) sector are largely driven by Chemical, Metal, Mineral Industries and Non-Energy Products from Fuels and Solvent Use. In 2018, the IPPU sector represented ~8% of Haryana's total economy-wide emissions. Between 2005 and 2018, the overall IPPU emissions increased at a compounded rate of 15.83% from 0.86 Mt CO₂e in 2005, to 5.81 Mt CO₂e in 2018. Chemical Industry was the major contributor to the overall IPPU emissions and they increased at a CAGR of 11.76% between 2005 and 2018. Emissions from the Mineral Industry and Non-Energy Products from Fuels and Solvent Use increased rapidly at rate of ~48% and ~26% (compounded annually), respectively, throughout the reference period. Emissions from the Metal Industry of Haryana were registered only till 2006. A steep rise in the overall IPPU emissions was observed after 2015, due to increase in emissions from the Chemical Industry (primarily from Ethylene Production) sub-sector (see Figure 7).

Figure 7: GHG Emissions Estimates of IPPU Sector - Haryana (2005 to 2018)



In 2018, Ethylene accounted for ~61% of the overall IPPU sector emissions, followed by Cement Production (~36%) and Others (~3%). Share of emissions from Cement Productions increased from ~2% in 2007 to ~36% in 2018. Whereas, share of Ethylene emissions reduced from ~96% in 2005 to ~61% in 2018 (see Figures 8 and Figure 9).

Figure 8: Percentage Share of GHG Emissions from IPPU Categories (2005 to 2018)

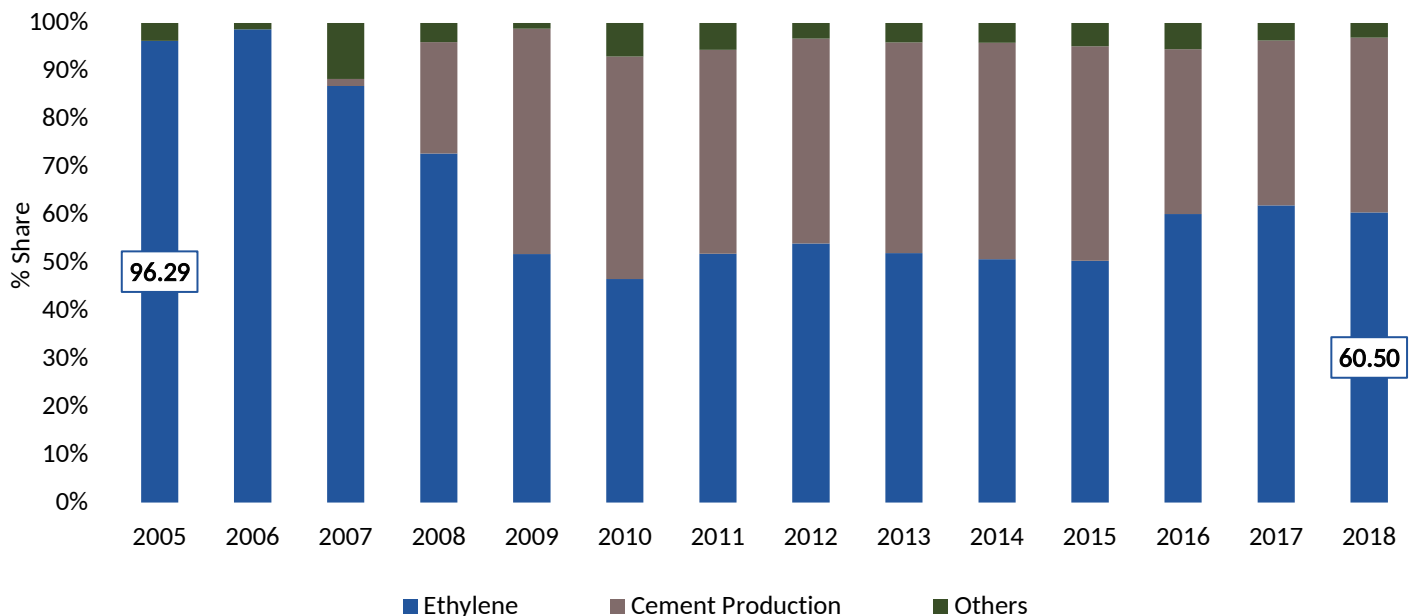
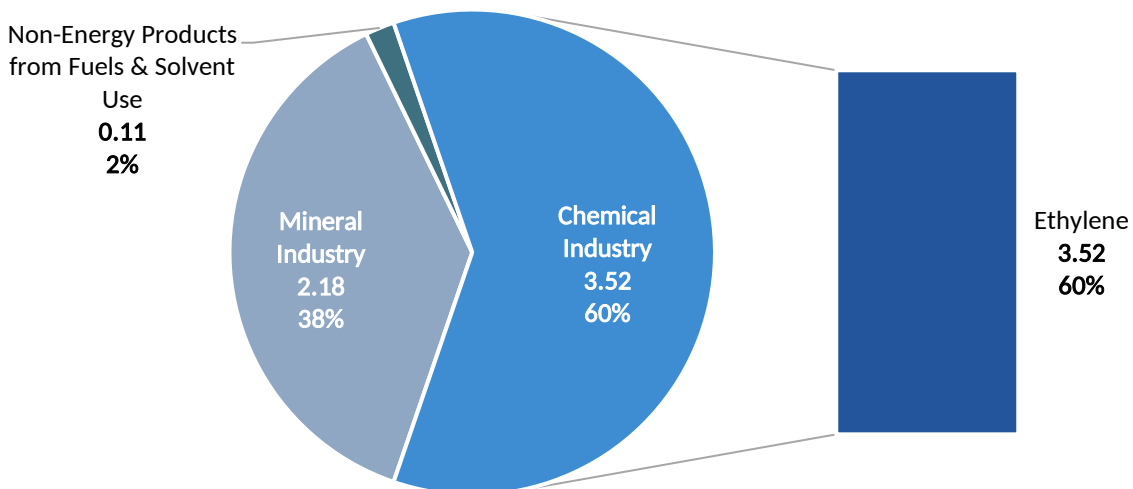


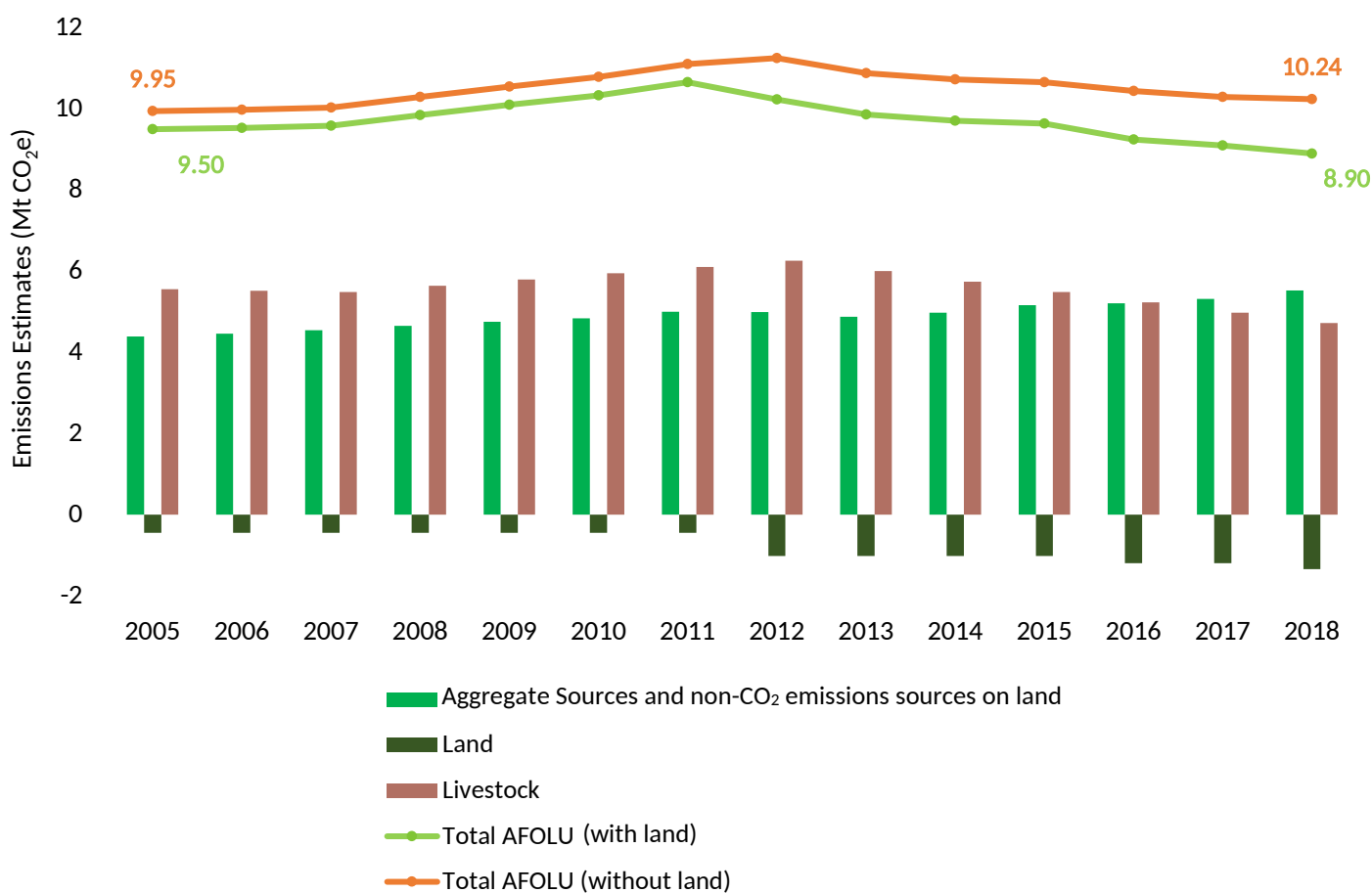
Figure 9: Sub-sector Emissions (Mt CO₂e) and Percentage Contribution in Total IPPU Emissions (2018)





Emissions from the Agriculture, Forestry and Other Land Use (AFOLU) sector arise from three main sub-sectors, namely Livestock, Land and Aggregate Sources and Non-CO₂ Emissions Sources on Land*. The AFOLU sector represented ~12% of Haryana’s net economy-wide emissions in 2018. While the Livestock and Aggregate Sources and Non-CO₂ Emissions Sources on Land sub-sectors were net GHG emitters, the Land sub-sector was a sink throughout the reference period (see Figure 10). Between 2005 and 2018, the net AFOLU emissions decreased at a rate of 0.50% (compounded annually) from 9.50 Mt CO₂e in 2005 to 8.90 Mt CO₂e in 2018. Within the Land sub-sector, Agricultural Land and Other Land categories were the major contributors to the overall sink. The enhancement of sink post 2015 can be attributed to the increase in removals from Forestland, Agricultural Land and Other Land. The average annual removals from the Land sub-sector in Haryana, during the reference period, were 0.78 Mt CO₂e, around 7.50% of the average annual gross AFOLU emissions (excluding Land sub-sector).

Figure 10: GHG Emissions of AFOLU Sector - Haryana (2005 to 2018)



In 2018, the Livestock sub-sector had the maximum share of ~46% of gross AFOLU GHG emissions (excluding Land sub-sector) in Haryana. Within the Livestock sub-sector, Enteric Fermentation category was the major contributor to the gross AFOLU emissions across the reference period with an average share of ~49%. However, the emissions from this category declined at a rate of 1.24% (compounded annually) from 5.55 Mt CO₂e in 2005 to 4.72 Mt CO₂e in 2018.

Within the Aggregate Sources sub-sector, the categories of Agriculture Soils and Rice Cultivation were the major contributors to gross AFOLU emissions with shares of ~28% and ~13%, respectively, during the reference period. The share of emissions from Agriculture Soils increased from ~28% in 2005 to ~32% in 2018 and that of Rice Cultivation increased from ~11% in 2005 to ~15% in 2018 (see Figures 11 and 12).

* The sub-sector called 'Aggregate Sources and Non-CO₂ Emissions Sources on Land' includes emissions from Rice Cultivation, Agriculture Soils, and Biomass Burning in Cropland and Forestland.

Figure 11: Category-wise Emissions (Mt CO₂e) and Percentage Share in Gross AFOLU Emissions (excluding Land Sub-sector) (2018)

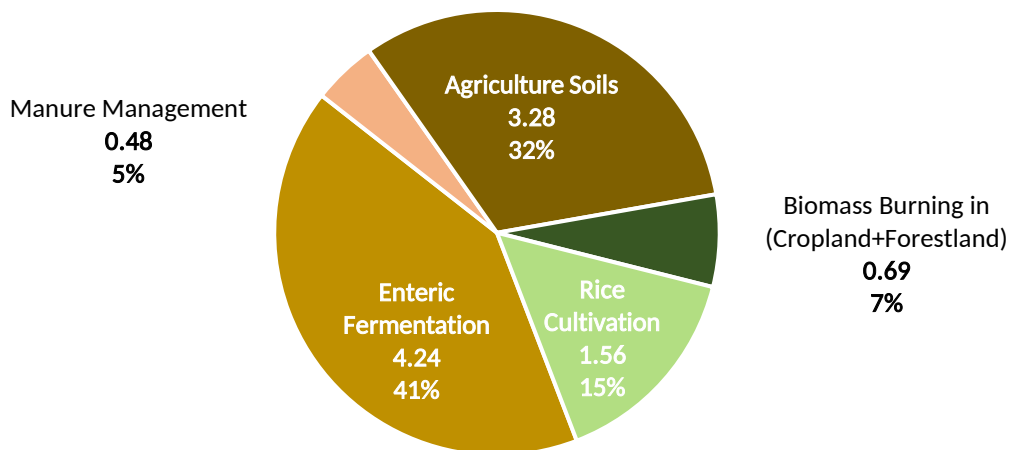
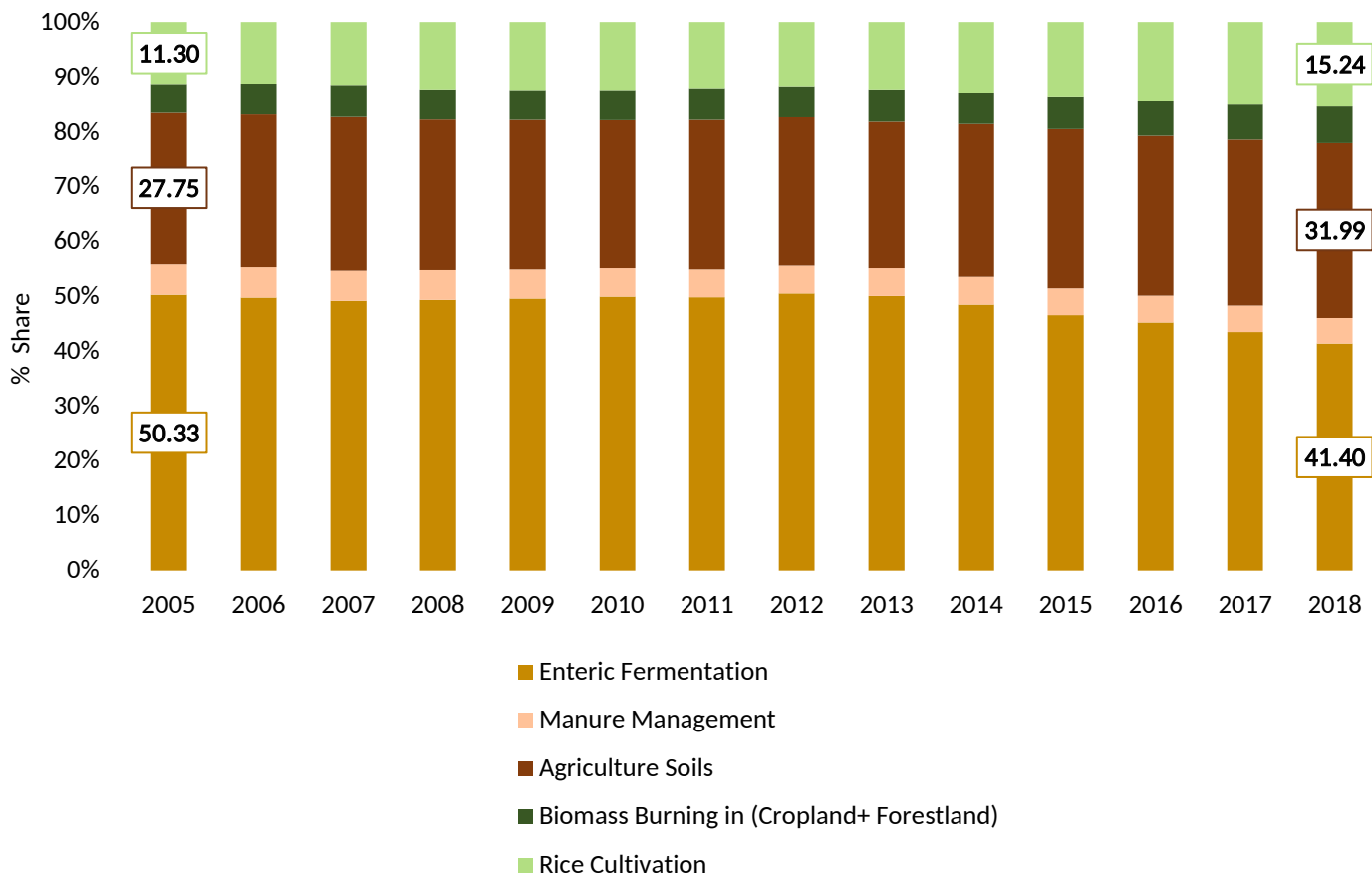


Figure 12: Category-wise Share of Gross AFOLU Emissions (excluding Land sub-sector) (2005 to 2018)





Waste Sector

Solid Waste Disposal, Domestic Wastewater and Industrial Wastewater are the key sources of GHG emissions in the Waste sector. In Haryana, Waste sector contributed to almost 3% of the total economy-wide emissions in 2018. Waste sector emissions increased at a CAGR of 3.87%, from 1.51 Mt CO₂e in 2005, to 2.48 Mt CO₂e in 2018 (see Figure 13). The overall Waste emissions peaked after 2010, largely due to increase in emissions from the Domestic Wastewater sub-sector. Further, a slight reduction in emissions was observed after 2014 due to decrease in emissions from the Industrial Wastewater sub-sector.

Figure 13: GHG Emissions Estimates of Waste Sector - Haryana (2005 to 2018)

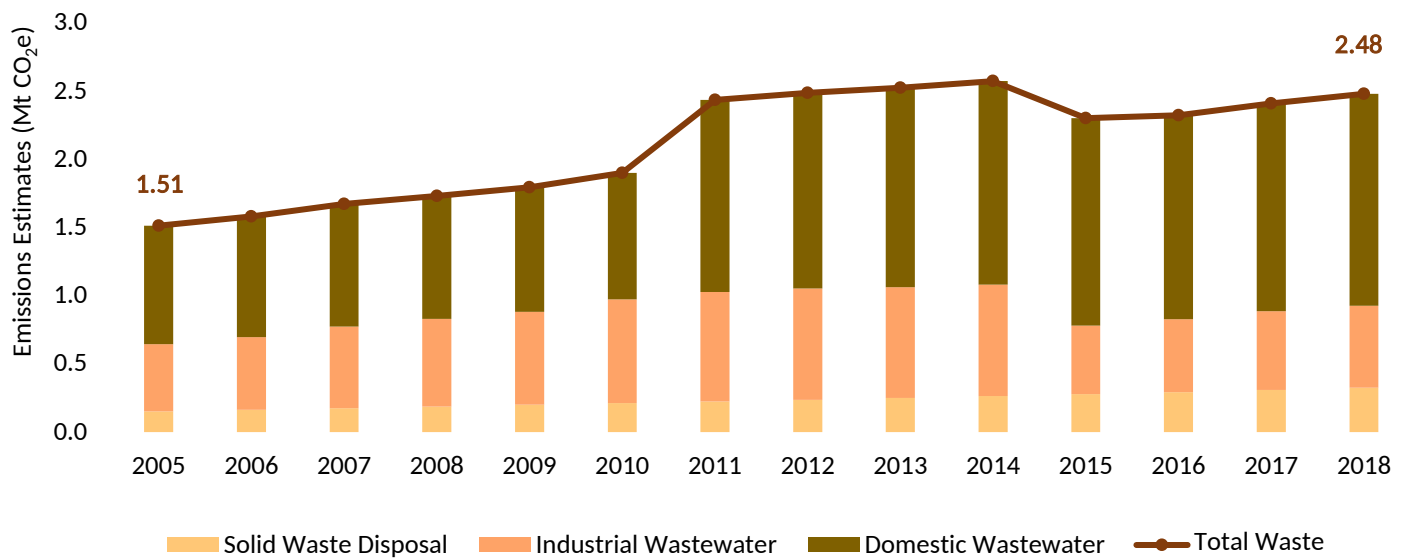
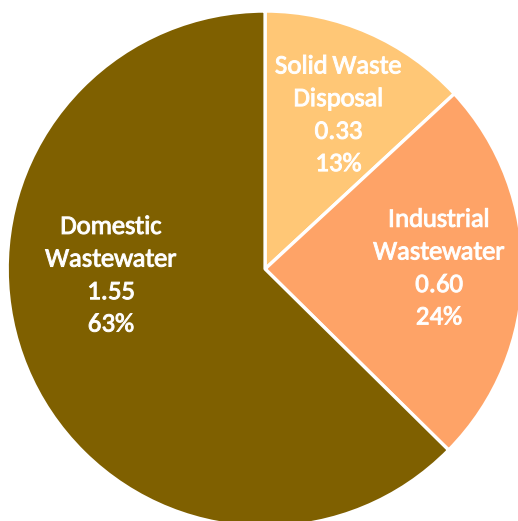


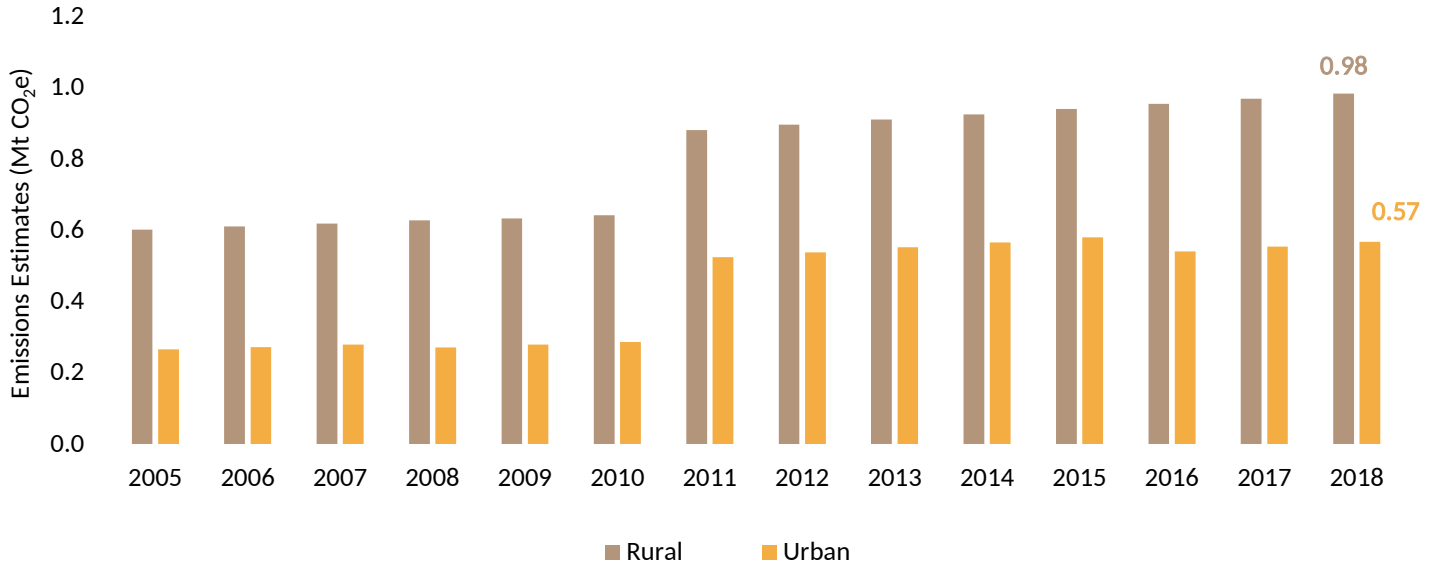
Figure 14: Sub-sector Emissions (Mt CO₂e) and Percentage Share in Total Waste Sector Emissions (2018)



Discharge of untreated wastewater and use of septic tanks are the key drivers of emissions due to Domestic Wastewater sub-sector. In 2018, Domestic Wastewater had a share of 63% in the total Waste sector emissions of Haryana. Approximately 13% of the Waste sector emissions were from Solid Waste Disposal, which increased at an estimated CAGR of 6% during the reference period, from 0.15 Mt CO₂e in 2005 to 0.33 Mt CO₂e in 2018. Industrial Wastewater accounted for nearly 24% of Waste sector emissions in 2018. Emissions from this sub-sector increased at a CAGR of 2%, from 0.49 Mt CO₂e in 2005 to 0.60 Mt CO₂e in 2018 (see Figure 14).

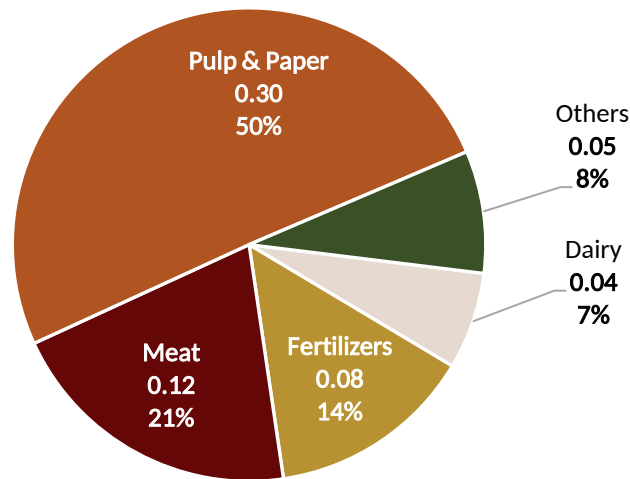
Emissions from Domestic Wastewater of both rural and urban areas grew at a CAGR of 5% from 0.87 Mt CO₂e in 2005 to 1.55 Mt CO₂e in 2018. Almost 63% of the Domestic Wastewater emissions (2018) emanated from rural areas of Haryana (see Figure 15).

Figure 15: Area-wise GHG Emissions Estimates of Domestic Wastewater (2005 to 2018)



In 2018, Pulp and Paper Industry was the leading GHG emitter under Industrial Wastewater emissions, with a share of ~50%. This was followed by Meat Industry (~21%), Fertilisers Industry (~14%), Dairy Industry (~7%) and others (~3%) as shown in Figure 16.

Figure 16: Category-wise Emissions (Mt CO₂e) and Percentage Share in Industrial Wastewater Emissions (2018)





The 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, IPPU, AFOLU and Waste.

The Platform comprises of the following civil society:



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.

The **International Maize and Wheat Improvement Center (CIMMYT)** is the global leader in agricultural research for development in wheat and maize-based farming systems.

Center for Study of Science, Technology and Policy (CSTEP) is a not for profit research organisation incorporated in 2005 u/s 25 of The Companies Act, 1956.

ICLEI - Local Governments for Sustainability is a leading global network of over 1,500 cities, towns and regions committed to building a sustainable future.

Vasudha Foundation, set up in 2010, is a not for profit organisation, working in the clean energy and climate policy space.

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