GHG Platform INDIA

Trend Analysis of GHG Emissions of ODISHA

GHG Platform India is a civil society initiative providing an independent estimation and analysis of India's Greenhouse Gas (GHG) emissions across key sectors.

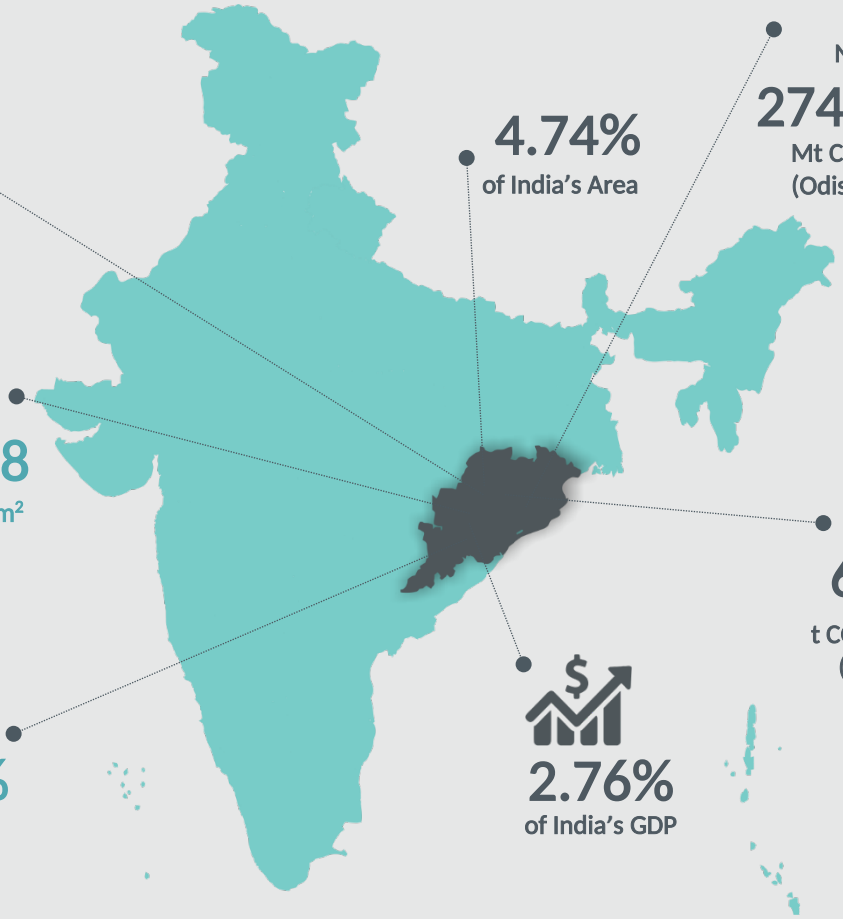
The Platform seeks to add value to the various ongoing GHG emissions estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's 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) and direct fuel combustion (industrial energy) has been reported under Energy sector.

Odisha at a Glance (2018)



3.38% of India's Population

4.74% of India's Area

Net GHG Emissions
274.54 Mt CO_2e (Odisha)
9.30% of India's emissions

Population Density
286.81 Persons/km² (Odisha)
401.48 Persons/km² (India)

Per Capita Emissions
6.15 t CO_2e/capita (Odisha)
2.24 t CO_2e/ capita (India)

Forest Area
33.32% of Odisha's Total Area
7.28% of India's Forest Area

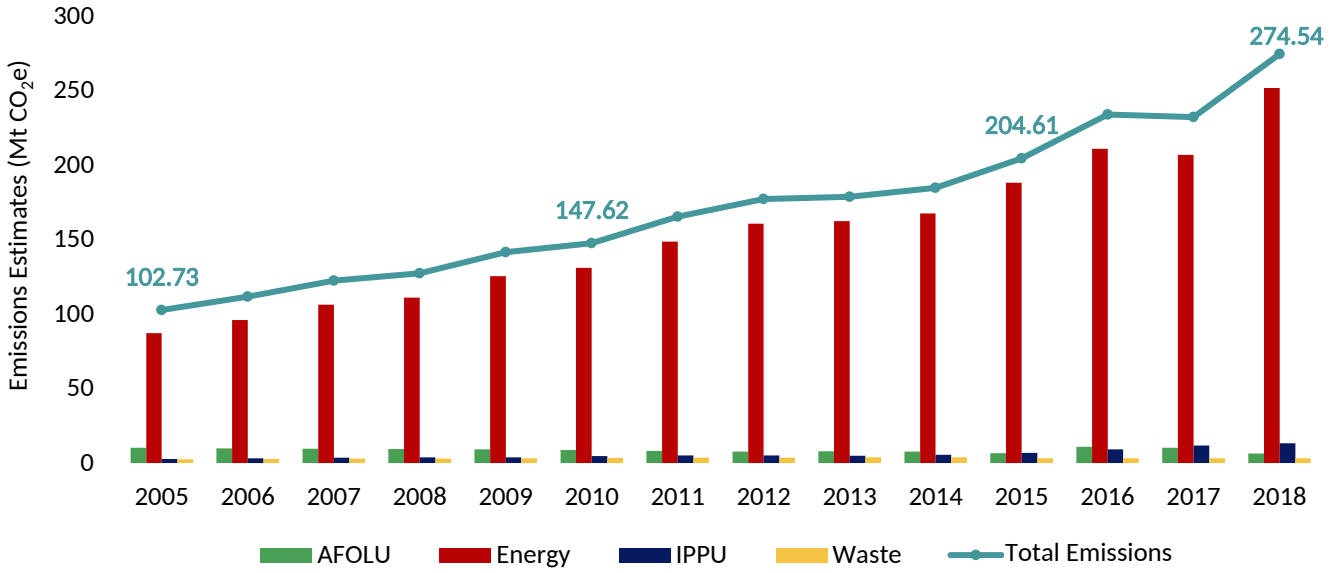
2.76% of India's GDP

Mt CO_2e – Million Tonnes of Carbon Dioxide Equivalent | CAGR – Compound Annual Growth Rate

*The map represents the data for 2018

Economy-wide Emissions Estimates

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



Emissions of Odisha grew at an estimated CAGR of 7.85%, from 102.73 Mt CO_2e in 2005 to 274.54 Mt CO_2e in 2018. A significant rise in the total emissions was observed in recent years owing to increased Energy sector emissions as shown in Figure 1. Emissions from the Energy sector in total economy-wide emissions increased from ~85% in 2005 to ~92% in 2018, while the share of emissions from Industrial Processes and Product Use (IPPU) increased from ~3% in 2005 to ~5% in 2018. However, the share of emissions from Agriculture, Forestry and Other Land-Use (AFOLU) sector decreased from ~10% in 2005 to 2% in 2018 and that of Waste sector reduced from~2% in 2005 to ~1% in 2018 (see Figure 2).

Figure 2: Sector-wise Contribution (Mt CO_2e) and Percentage Share in Economy-wide GHG Emissions of Odisha

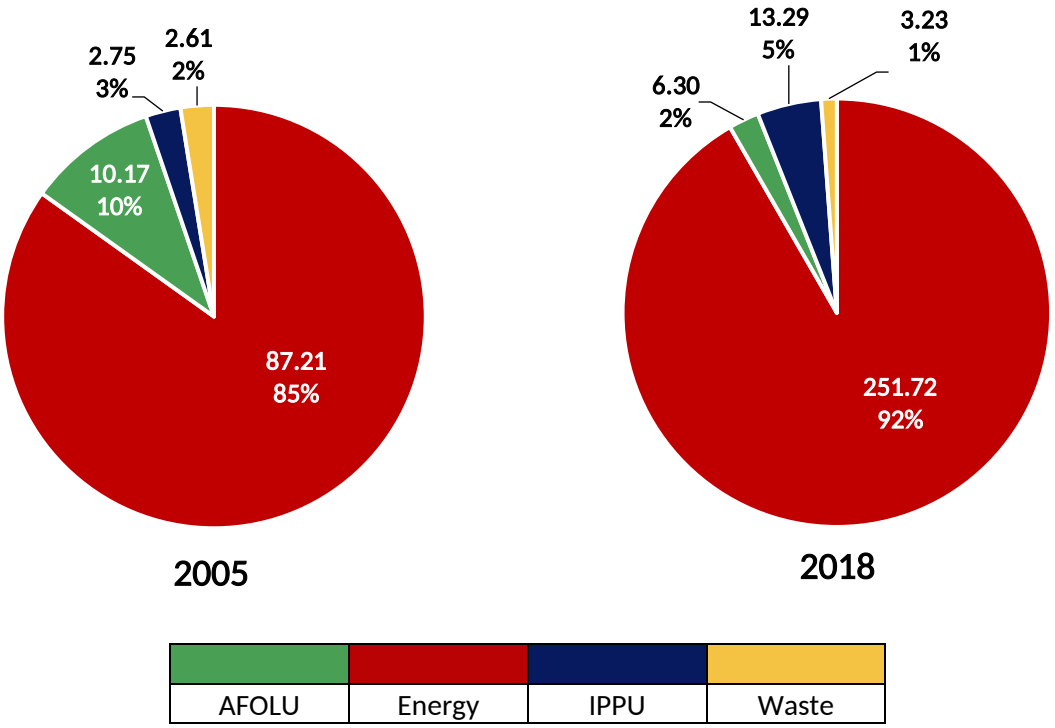
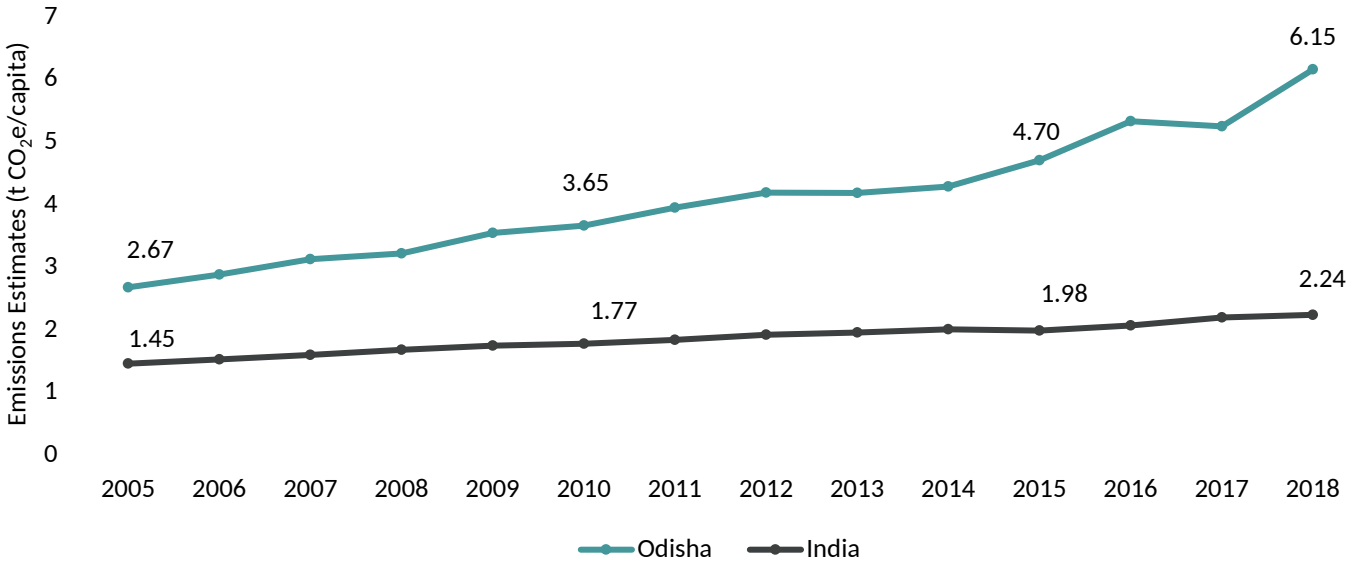


Figure 3: Per Capita GHG Emissions of Odisha and India (2005 to 2018)



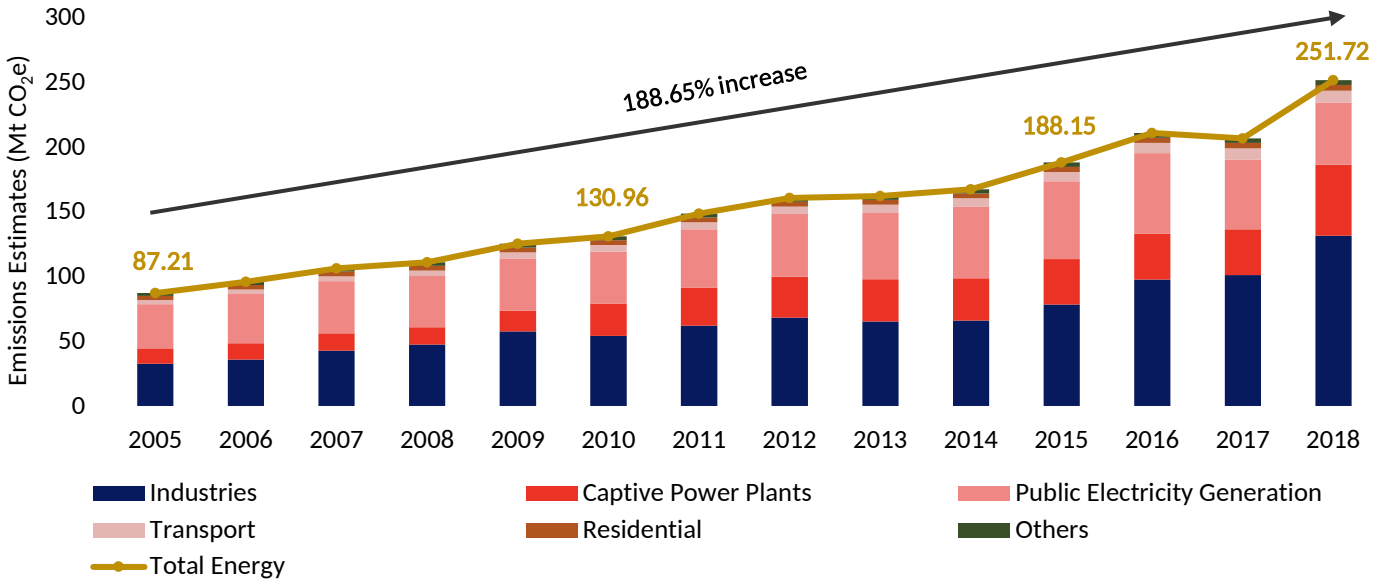
The per capita emissions of Odisha were higher than the per capita emissions of India throughout the reference period, as illustrated in Figure 3. Odisha's per capita emissions increased at a compounded rate of 6.63% from 2.57 t CO_2e/capita in 2005 to 6.15 t CO_2e/capita in 2018, which is almost double that 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 Odisha accounted for ~92% of the total economy-wide emissions in 2018. Emissions from the Energy sector grew at a CAGR of 8.50% from 87.21 Mt CO_2e in 2005 to 251.72 Mt CO_2e in 2018, as illustrated in Figure 4.

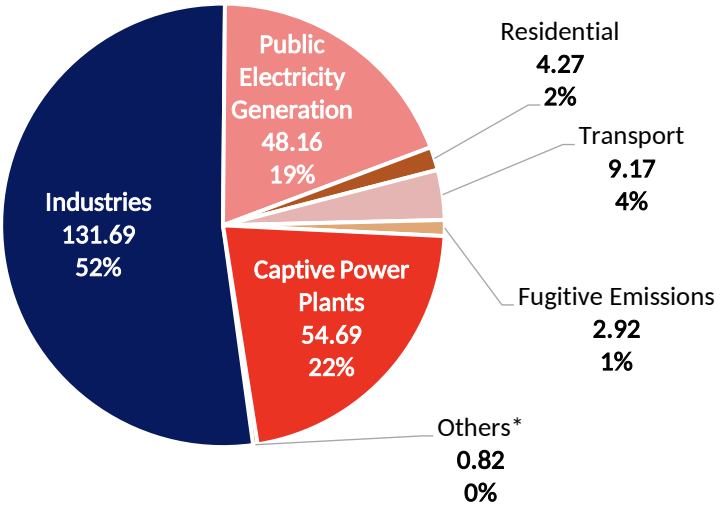
Figure 4: GHG Emissions Estimates of Energy Sector - Odisha (2005 to 2018)



Within the Energy Sector, the Industrial Energy category was the leading contributor to GHG emissions with a share of ~52% in 2018. This was followed by Captive Power Plants, Public Electricity Generation and Transport categories with shares of ~22%, ~19% and ~4%, respectively (see Figure 5).

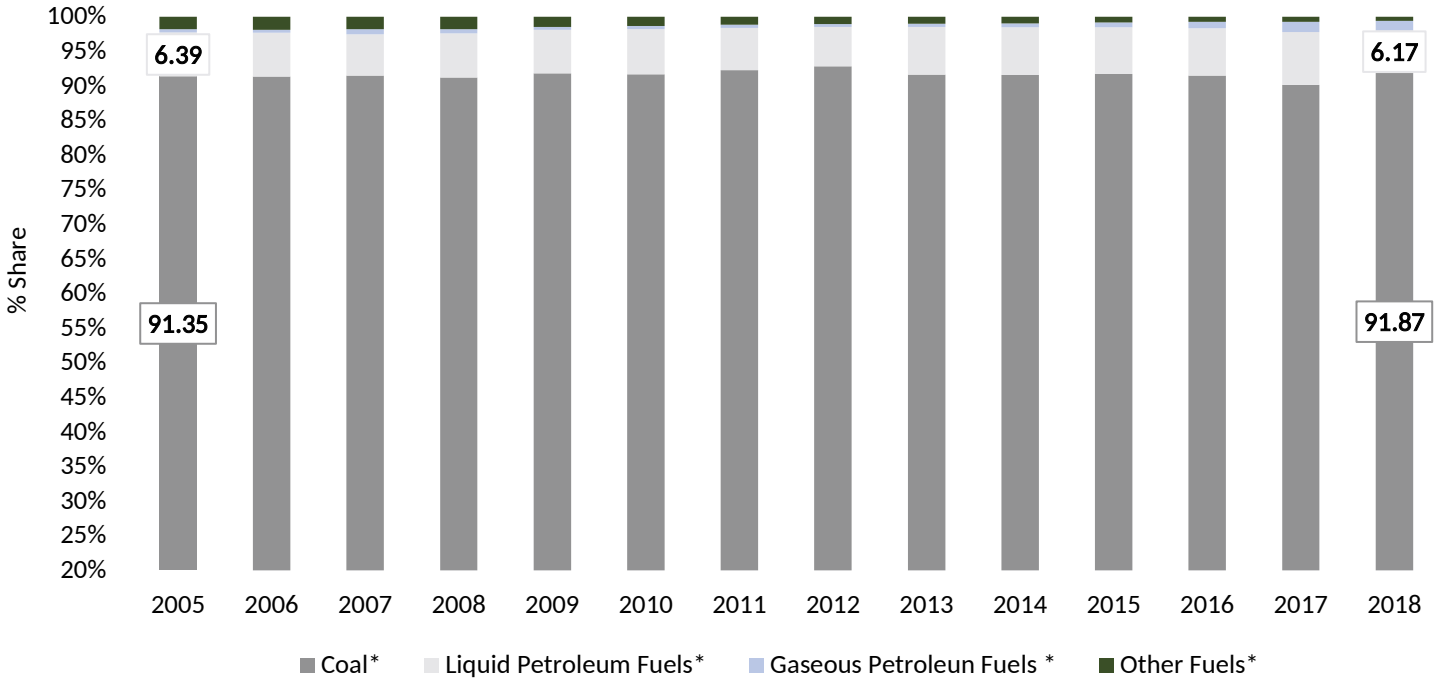
Within the Fuel Combustion sub-sector, emissions from Coal were the major contributor, with an average share of ~92%, during the reference period. Emissions were also registered from the Liquid Petroleum Fuels and Gaseous Petroleum Fuels with average shares of ~6.5% and ~1 %, respectively, between 2005 and 2018 (see Figure 6).

Figure 5: Category-wise Emissions (Mt CO_2e) and Percentage Share Total Energy Sector Emissions (2018)



Others category includes Agriculture, Commercial and Fisheries categories

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



**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

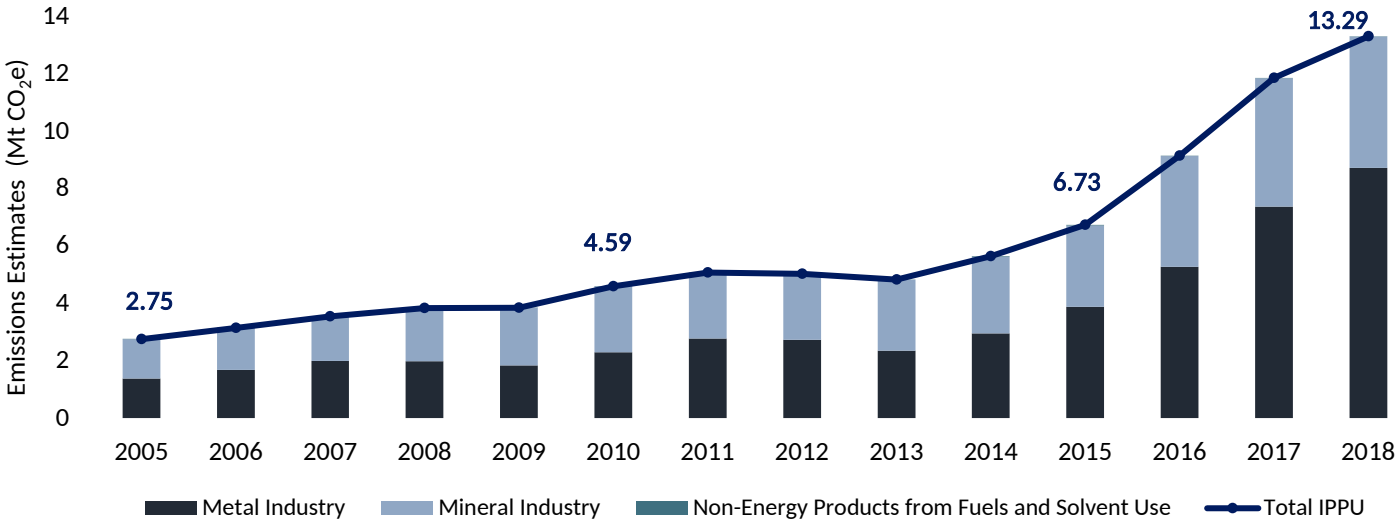
3. Liquid Petroleum Fuels - ATF, diesel, kerosene, motor spirit and other liquid fuels

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. The IPPU sector of Odisha represented ~5% of the total economy-wide emissions in 2018. Emissions from this sector increased by a whopping multiple of almost 5 during the reference period, with a CAGR of 12.89% from 2.75 Mt CO_2e in 2005 to 13.29 Mt CO_2e in 2018. A steep rise in the overall IPPU emissions was observed after 2013 owing to increased emissions from both Metal (primarily from Iron and Steel Production) and Mineral (primarily from Cement Production) Industries, as illustrated in Figure 7.

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



A detailed trend of the GHG emissions by various IPPU categories is depicted in Figure 8. Cement Production was the key driver of GHG emissions in the sector with an average share of ~45% across the reference period. However, its share in the total IPPU emissions reduced from ~50% in 2005 to ~34% in 2018. Significant emissions were also registered from Aluminium and Iron and Steel Production in Odisha's IPPU emissions with their combined share increasing from ~50% in 2005 to ~65% in 2018, as illustrated (see Figure 8 and 9).

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

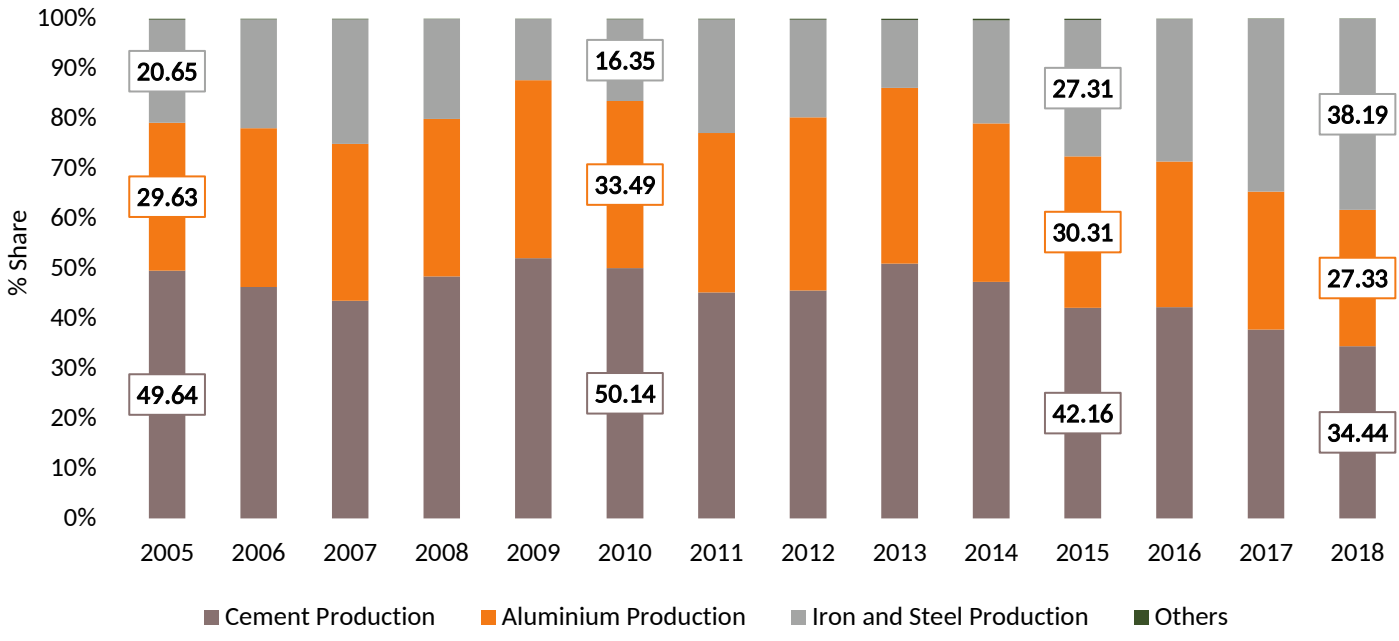
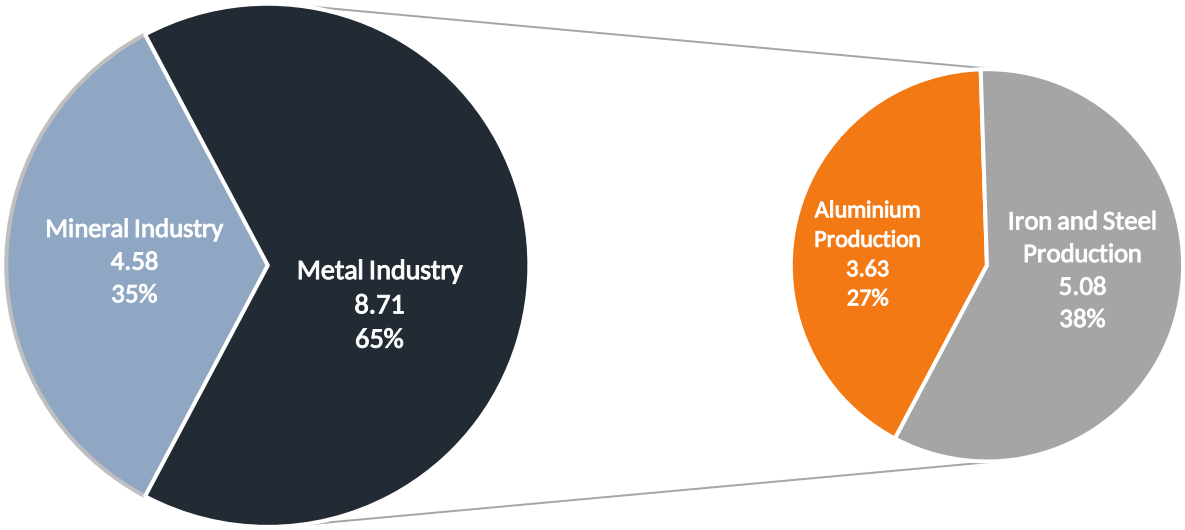


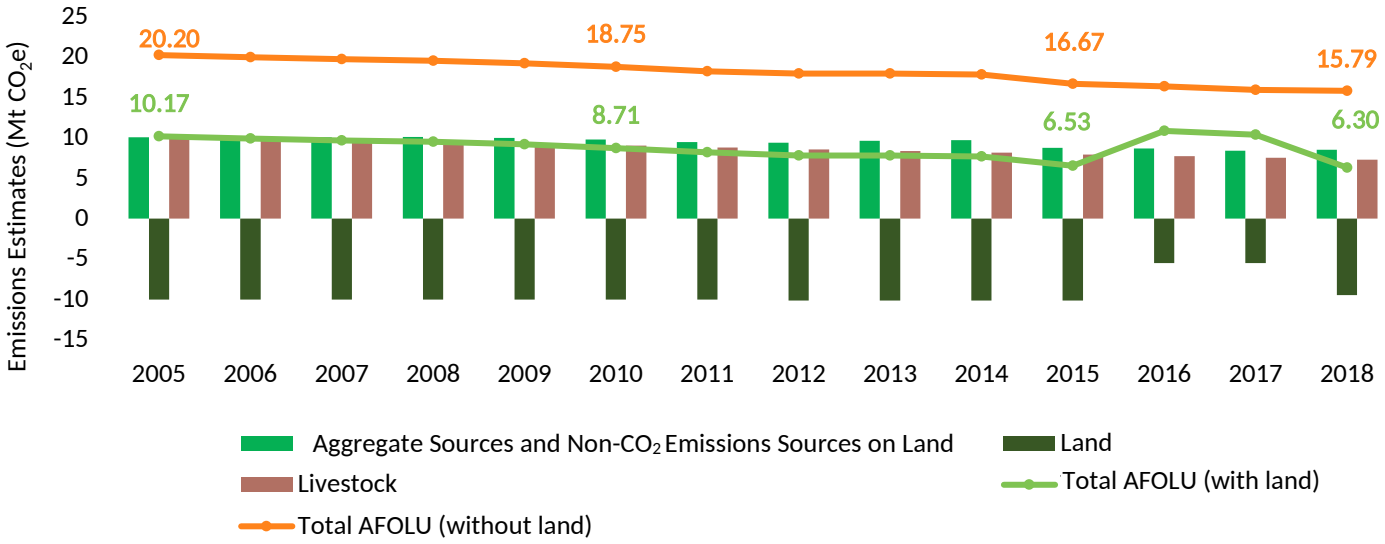
Figure 9: Sub-sector Emissions (Mt CO_2e) and Percentage Share in Total IPPU Emissions (2018)



AFOLU Sector

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-CO_2 Emissions Sources on Land*. Emissions from AFOLU sector represented ~2% of the total economy-wide emissions in Odisha in 2018. The net emissions of the AFOLU sector declined at a CAGR of 3.62% from 10.17 Mt CO_2e in 2005 to 6.30 Mt CO_2e in 2018, as illustrated in Figure 10. There is a noticeable increment in the net AFOLU emissions in 2016 and 2017, caused by reduction in removals from the Land sub-sector. This reduction in removals can be attributed to relatively smaller increases in forest area and decline in carbon stock density of the forests, as reported by Forest Survey of India (2021)**. The average annual removals from the Land sub-sector in Odisha during the reference period were 9.38 Mt CO_2e, around ~51.74% of the average annual gross AFOLU emissions.

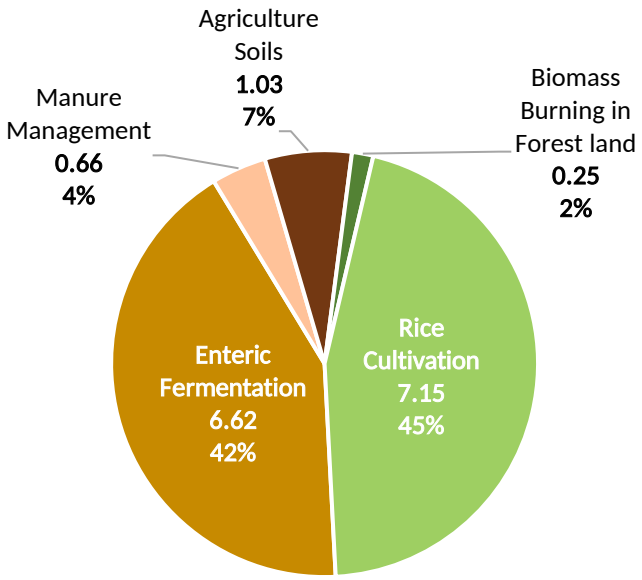
Figure 10: GHG Emissions Estimates of AFOLU Sector - Odisha (2005 to 2018)



The Aggregate Sources sub-sector had the maximum share of ~54% of gross AFOLU emissions (excluding Land sub-sector) of Odisha in 2018. Within this sub-sector, Rice Cultivation and Agriculture Soils were the major contributors to gross AFOLU emissions with average shares of ~43% and ~5% respectively, during the reference period. The share of emissions from Rice Cultivation increased from ~40% in 2005 to ~51% in 2018 and that of Agriculture Soils increased from ~4% in 2005 to ~7% in 2018.

From the Livestock sub-sector, Enteric Fermentation category was the major contributor to gross AFOLU emissions across the reference period with an average share of ~43%. Emissions from this category declined at a rate of 2.51% (compounded annually) from 9.22 Mt CO_2e in 2005 to 6.62 Mt CO_2e in 2018 (see Figures 11 and 12).

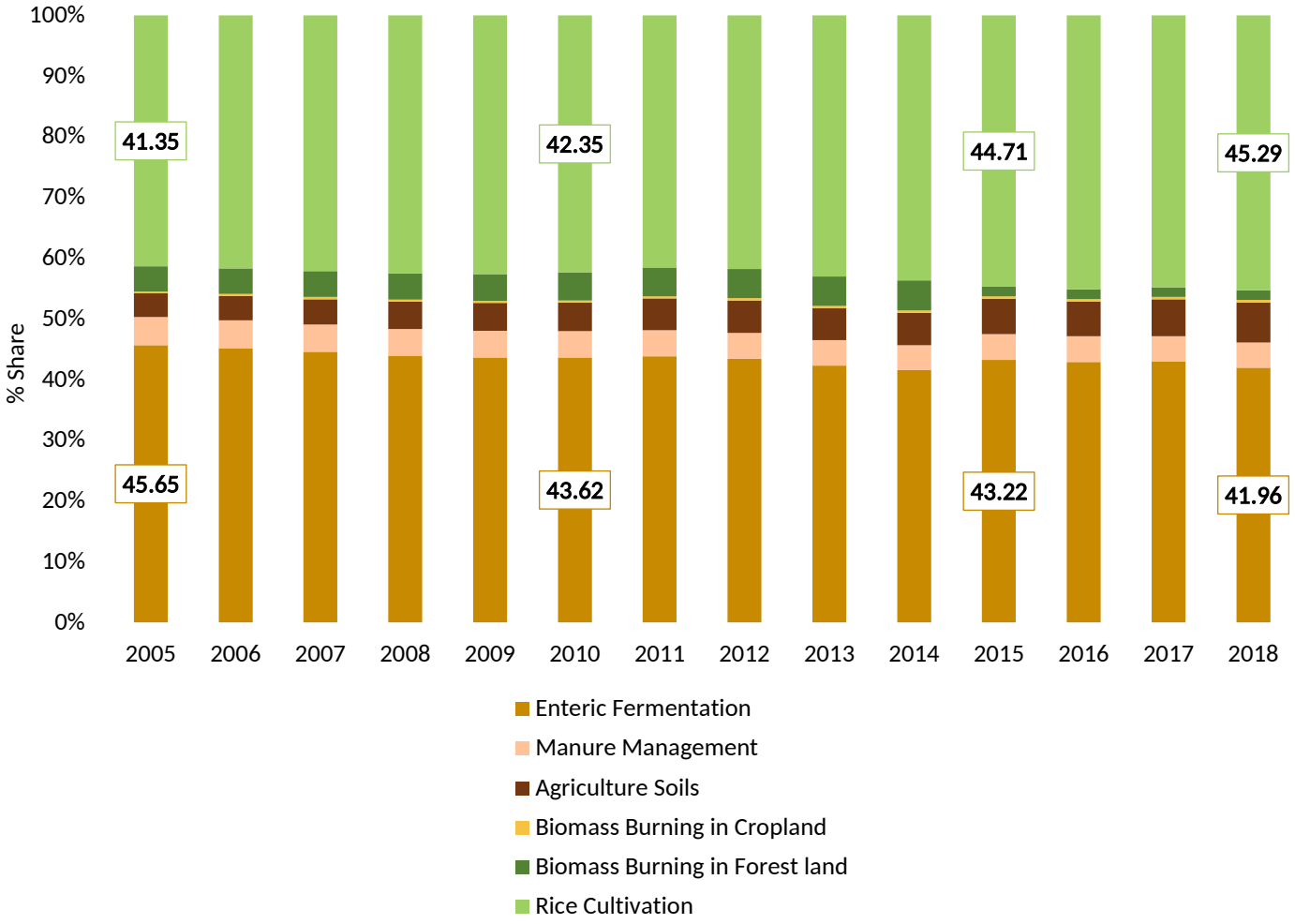
Figure 11: Category-wise Emissions (Mt CO_2e) and Percentage Share in Gross AFOLU Emissions (excluding Land sub-sector) (2018)



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

*** FSI Report 2021 reports data for 2019*

Figure 12: Category-wise Percentage Share in 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 Odisha, the Waste sector contributed ~1% to total economy-wide emissions in 2018. Emissions from the Waste sector increased at a CAGR of 1.64% from 2.61 Mt CO_2e in 2005 to 3.23 Mt CO_2e 2018. In 2015, there was a dip in overall Waste sector emissions owing to decrease in Industrial Wastewater emissions as illustrated in Figure 13.

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

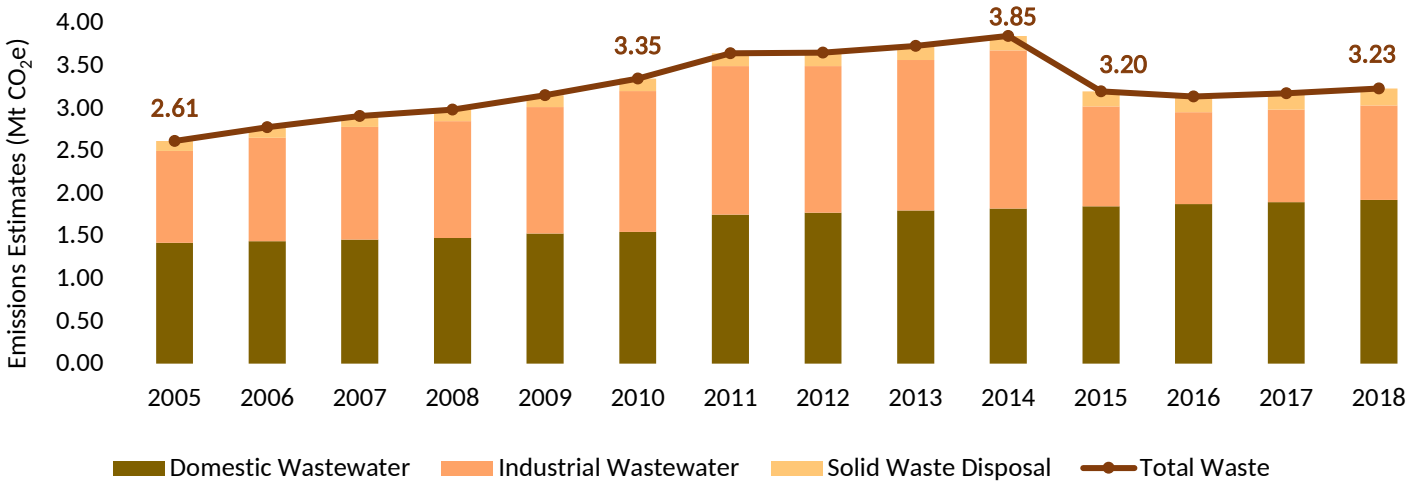
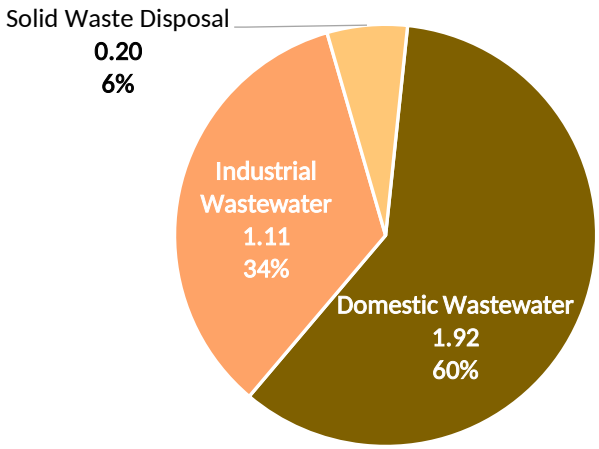


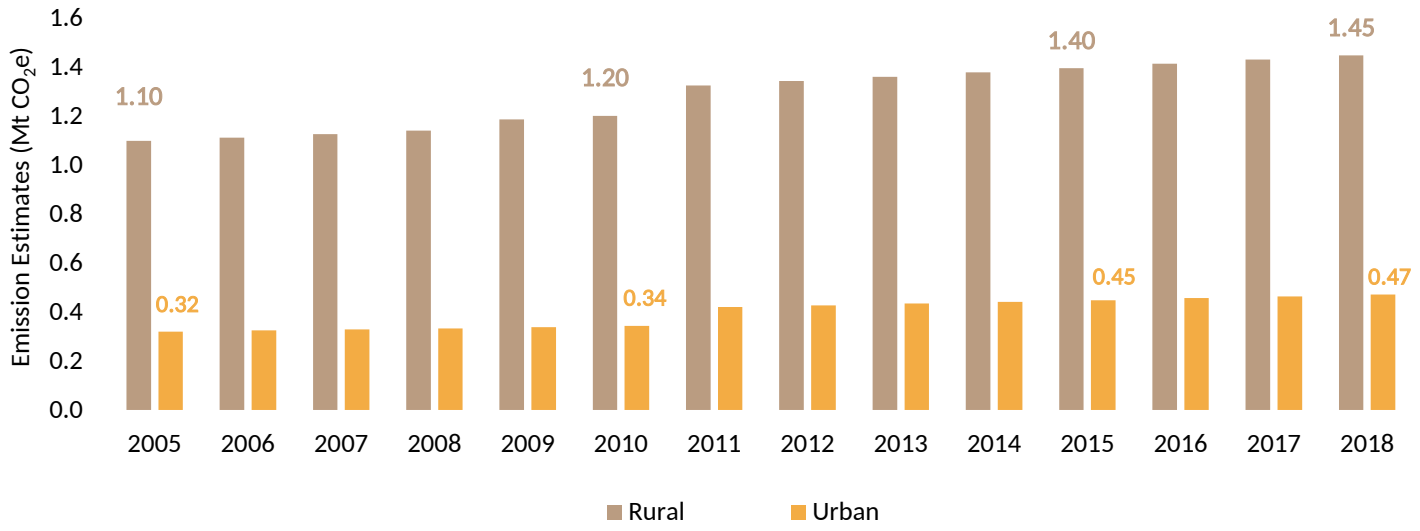
Figure 14: Sub-sector Emissions (Mt CO_2e) and Percentage Share in Total Waste Sector Emissions (2018)



Discharge of untreated wastewater and use of septic tanks are the key drivers of emissions due to Domestic Wastewater sub-sector. Domestic Wastewater sub-sector held a major share of ~60% of total Waste sector emissions of Odisha in 2018. Approximately, ~6% of total Waste sector emissions were from Solid Waste Disposal and this sub-sector's emissions grew at a CAGR of 4.09% from 0.12 Mt CO_2e in 2005 to 0.20 Mt CO_2e in 2018. Industrial Wastewater accounted for ~34% of total Waste emissions, which declined at a CAGR of 0.23% from 1.08 Mt CO_2e in 2005 to 1.11 Mt CO_2e in 2018 (see Figure 14).

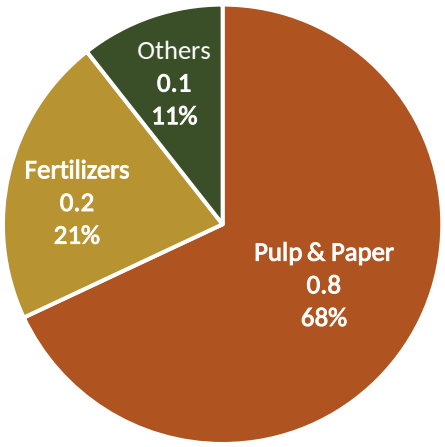
Emissions due to the Domestic Wastewater from both rural and urban areas increased at a CAGR of 2.36% from 1.42 Mt CO_2e 2005 to 1.92 Mt CO_2e 2018. The majority of the Domestic Wastewater emissions were observed from the rural areas of Odisha with a share of ~76% across the reference period, as illustrated in Figure 15 below.

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



As illustrated in Figure 16, the Pulp and Paper Industry was the major contributor to the Industrial Wastewater emissions with a share of 68~% in 2018. This was followed by Fertilizers and Other industries, with shares of ~21% and ~11%, respectively, in 2018.

Figure 16: Category-wise Emissions (Mt CO_2e) and Percentage Share in Total Industrial Wastewater Emissions (2018)



GHG Platform INDIA

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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