

# Trend Analysis of GHG Emissions of JHARKHAND

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

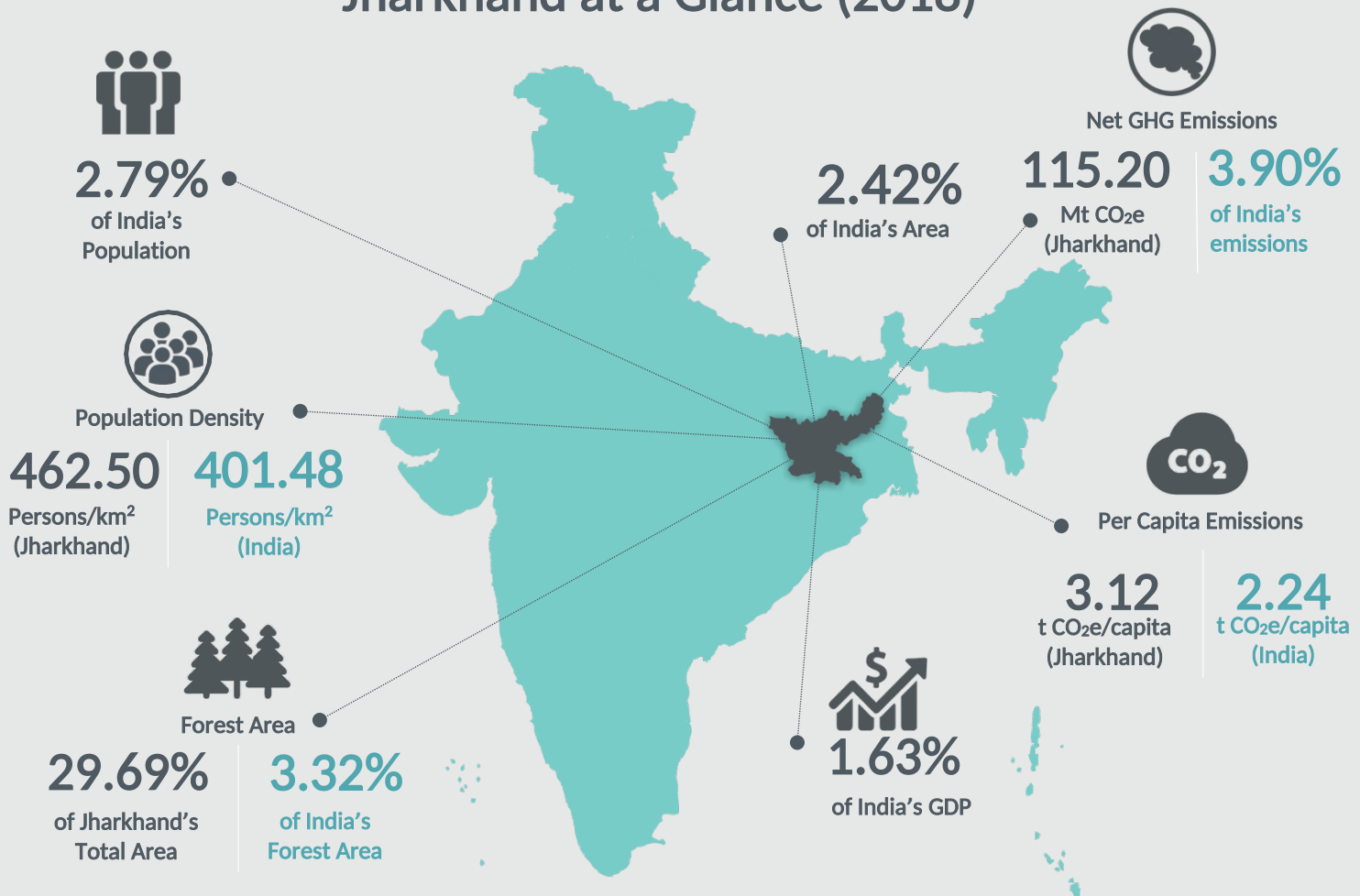
The Platform seeks to add value to the various ongoing GHG emissions estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

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



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

## Jharkhand at a Glance (2018)

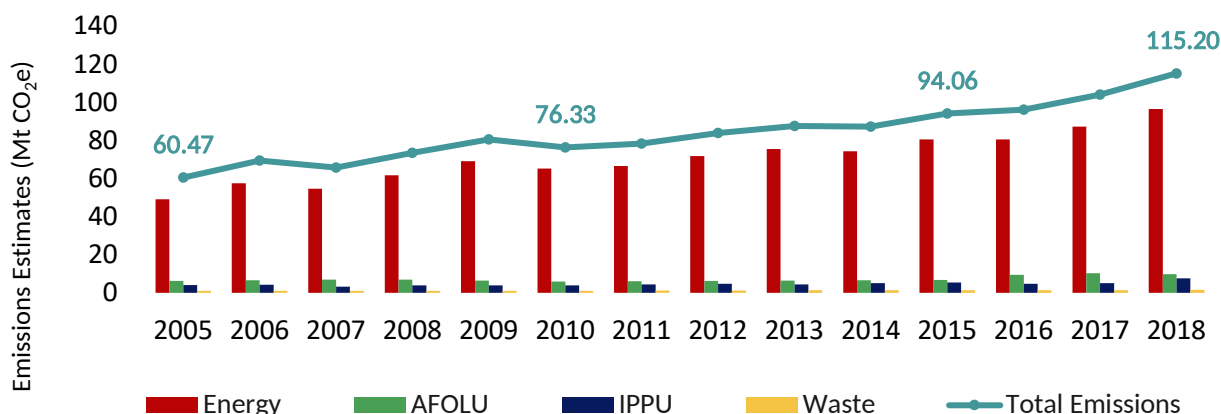


\*Mt CO<sub>2</sub>e – Million Tonnes of Carbon Dioxide Equivalent | CAGR – Compound Annual Growth Rate

\*The map represents the data for 2018

# Economy-wide Emissions Estimates

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



Emissions of Jharkhand grew from 60.47 Mt CO<sub>2</sub>e in 2005 to 115.20 Mt CO<sub>2</sub>e in 2018, at a CAGR of 5.08%, as depicted in Figure 1. The Energy sector was a major contributor to the total economy-wide emissions in Jharkhand throughout the reference period. The share of emissions from the Energy sector grew from 81% in 2005 to 84% in 2018 (see Figure 2).

Whereas, the contribution of Agriculture, Forest, and Other Land Use (AFOLU) in total economy-wide emissions reduced from 10% in 2005 to 8% in 2018. Contribution of Industrial Processes and Product Use (IPPU) sector emissions remained consistent at ~7% through the reference period, while the share of Waste sector declined marginally from 2% in 2005 to 1% in 2018.

Figure 2: Sector-wise Contribution (Mt CO<sub>2</sub>e) and Percentage Share in Total Economy-wide GHG Emissions of Jharkhand

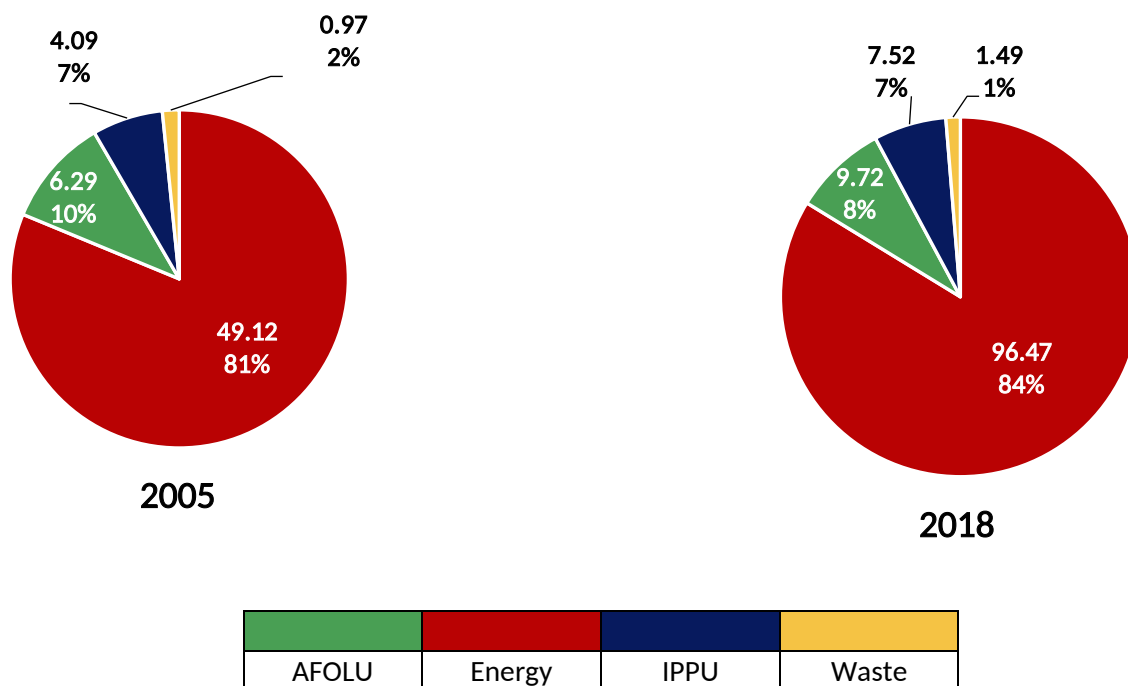
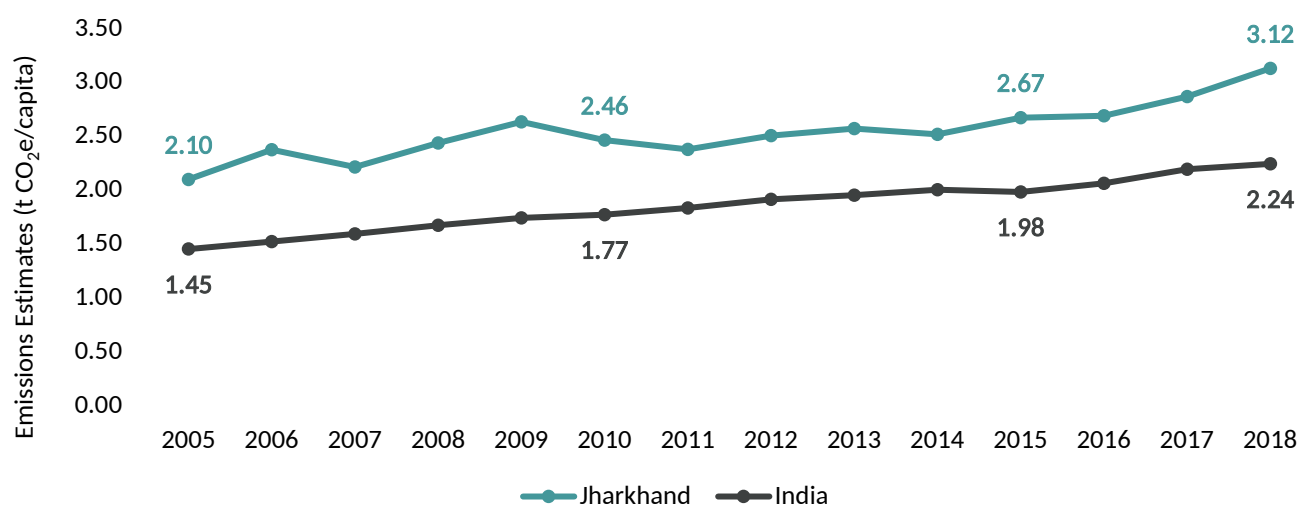


Figure 3: Per Capita GHG Emissions of Jharkhand and India (2005 to 2018)



The per capita emissions of Jharkhand grew from 2.10 t CO<sub>2</sub>e/capita in 2005 to 3.12 t CO<sub>2</sub>e/capita in 2018 as shown in Figure 3. When compared to per capita emissions of India, the state of Jharkhand registered higher per capita emissions across the reference period, growing at a CAGR of 3.12%, between 2005 and 2018, which was slightly lower than India's CAGR (~3.41%).

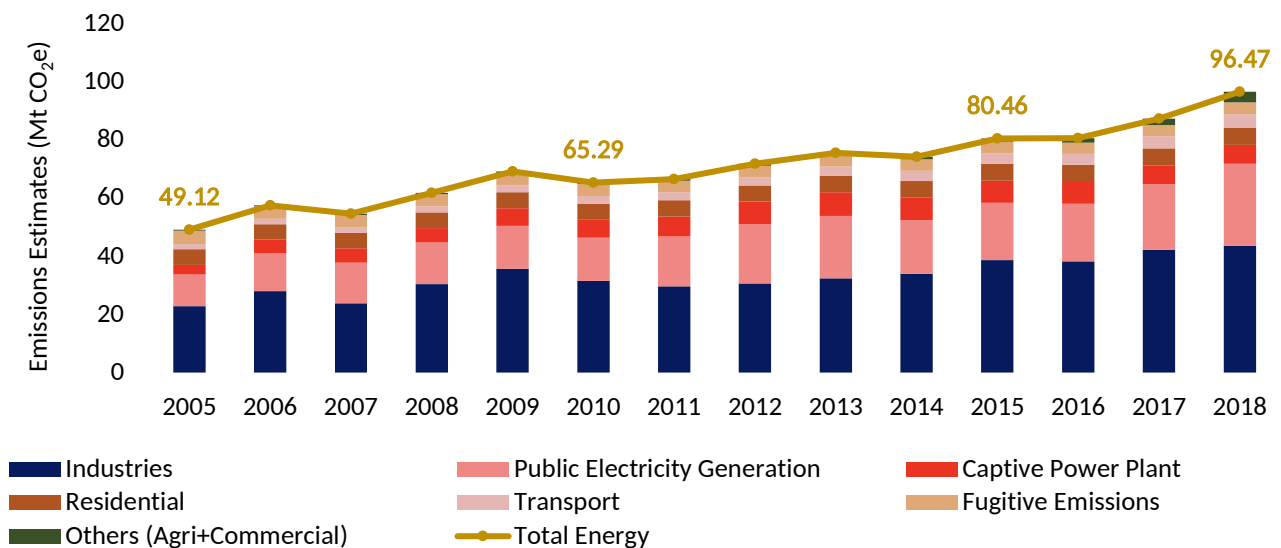
# Energy Sector



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

In Jharkhand, Energy sector represented ~84% of the total economy-wide emissions in 2018. Notably, majority of the emissions in Jharkhand resulted due to Fuel Combustion sub-sector and remaining emissions were from the Fugitive Emissions sub-sector. Emissions from the Energy sector increased at a CAGR 5.33% from 49.12 Mt CO<sub>2</sub>e in 2005 to 96.47 Mt CO<sub>2</sub>e in 2018 as shown in Figure 4.

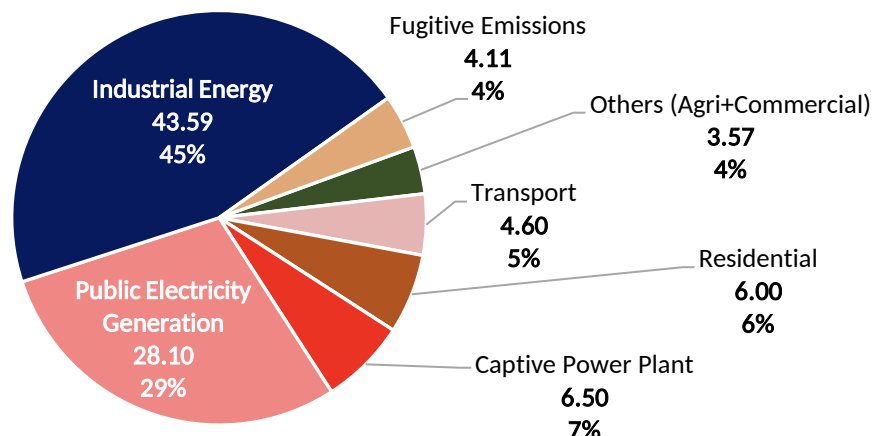
Figure 4: GHG Emissions Estimates of Energy Sector - Jharkhand (2005 to 2018)



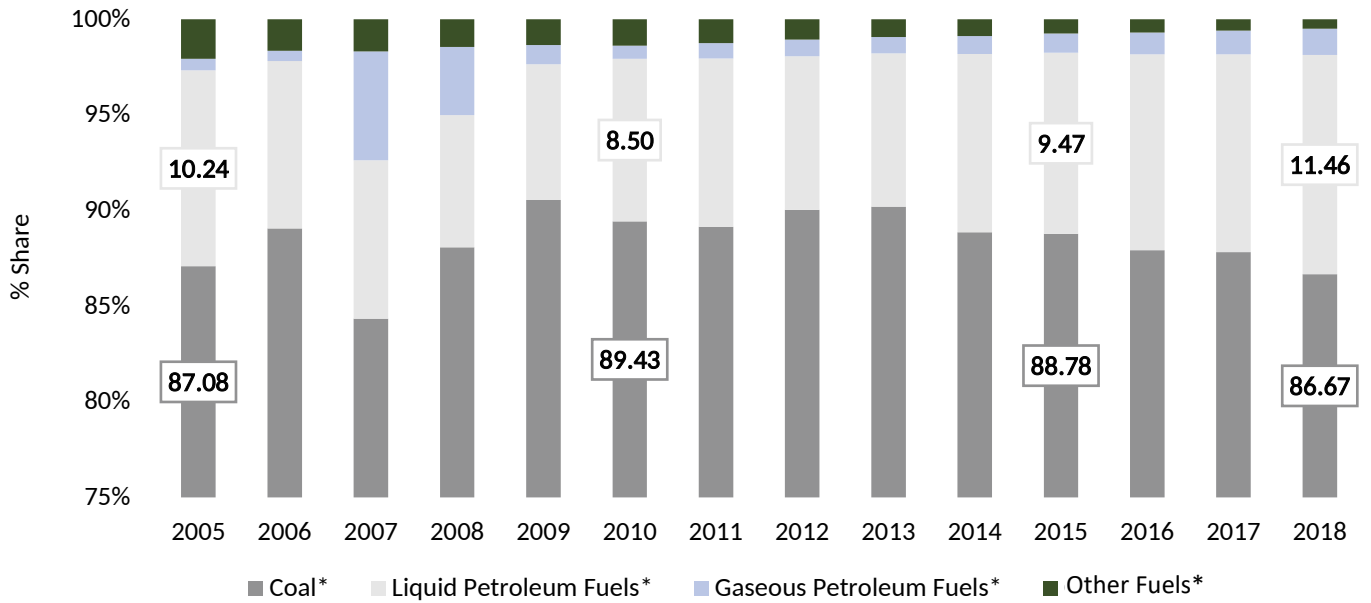
Within the Energy sector, Industrial Energy category was the leading contributor to GHG emissions with a share of ~45% in the total Energy emissions in 2018. This was followed by Public Electricity Generation category with a share of ~29% and Captive Power Plants with a share of ~7% in 2018 (see Figure 5).

Within the Fuel-Combustion sub-sector, emissions from Coal were the major contributor in the state, with an average share of ~88% of the total Energy emissions, across the reference period (see Figure 6). This was followed by emissions from combustion of Liquid Petroleum Fuels, with an average share of ~9% between 2005 and 2018. Gaseous Petroleum Fuels had an average share of ~1.5%, while Other Fuels contributed ~1% to the Fuel Combustion emissions throughout the reference period.

Figure 5: Category-wise Emissions (Mt CO<sub>2</sub>e) 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. Liquid Petroleum Fuels - ATF, diesel, kerosene, motor spirit and other liquid fuels.
3. Gaseous Petroleum Fuels - natural gas, LPG and other gaseous 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 represented ~7% of the total economy-wide emissions of Jharkhand in 2018. Between 2005 and 2018, the overall IPPU emissions increased from 4.09 Mt CO<sub>2</sub>e to 7.52 Mt CO<sub>2</sub>e at a CAGR of 4.80%. Emissions from the IPPU sector of the state were primarily driven by emissions from the Iron and Steel Production in Metal Industry sub-sector and Cement Production in Mineral Industry sub-sector. The rise in IPPU emissions in 2018 can be attributed to the almost 2.5 times increase in emissions from Iron and Steel Production category between 2017 and 2018 (see Figure 7).

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

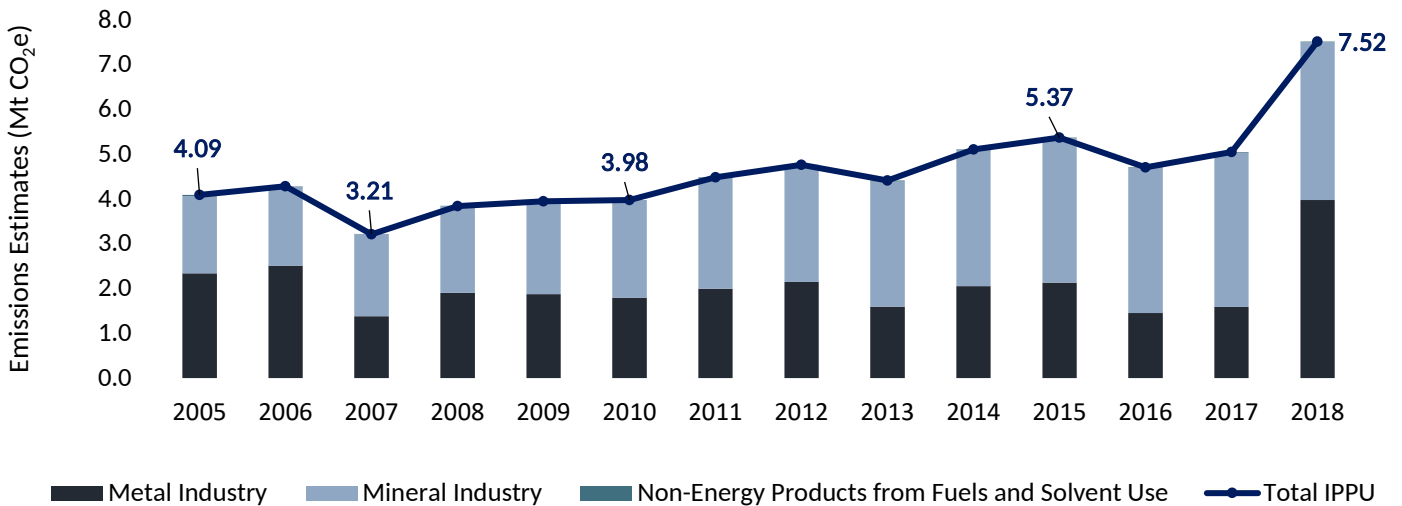
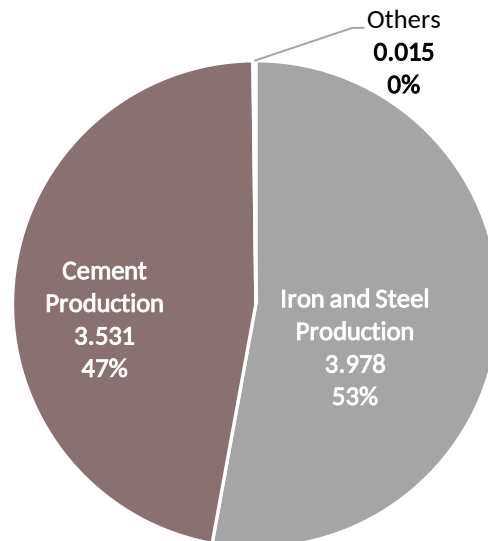
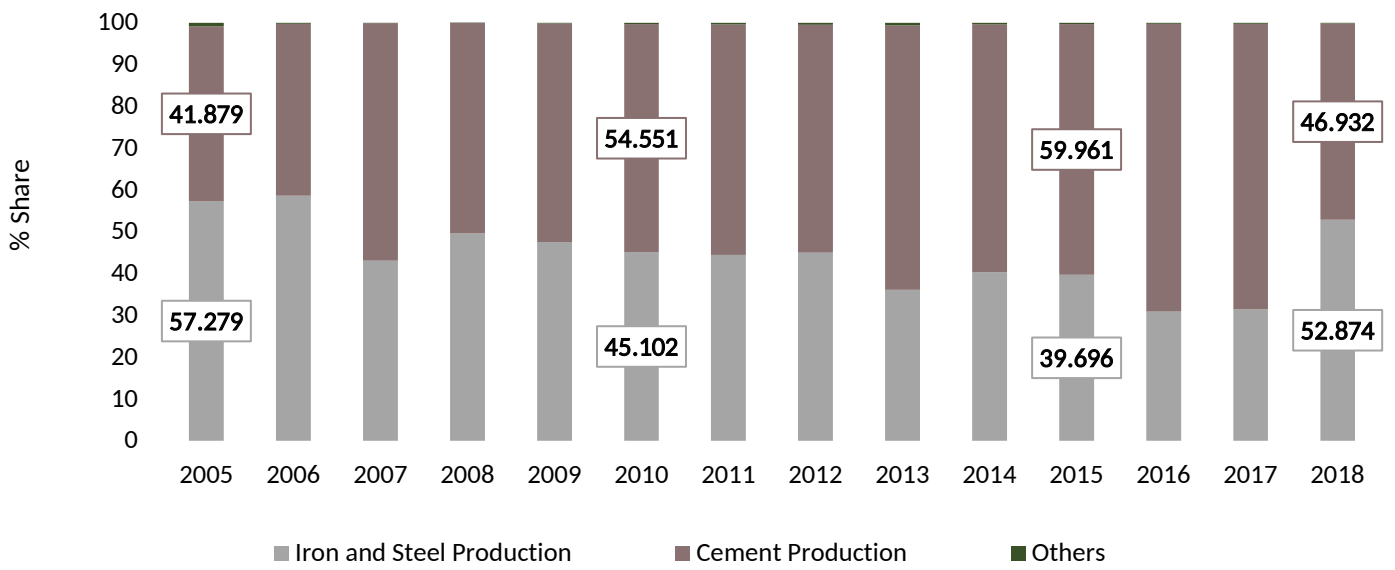


Figure 8: Sub-Sector Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total IPPU Emissions (2018)



Iron and Steel Production (53%) and Cement Production (47%) were the major emitting categories in the sector in 2018. As observed in Figure 9, the share of Iron and Steel Production declined to ~31% in 2017, while Cement Production emissions increased steadily to ~68% in the same year. However, a sudden increase in the share of emissions from the Iron and Steel Industries (~53%) was observed in 2018.

Figure 9: Category-wise Percentage Share of GHG Emissions from IPPU Categories (2005 to 2018)



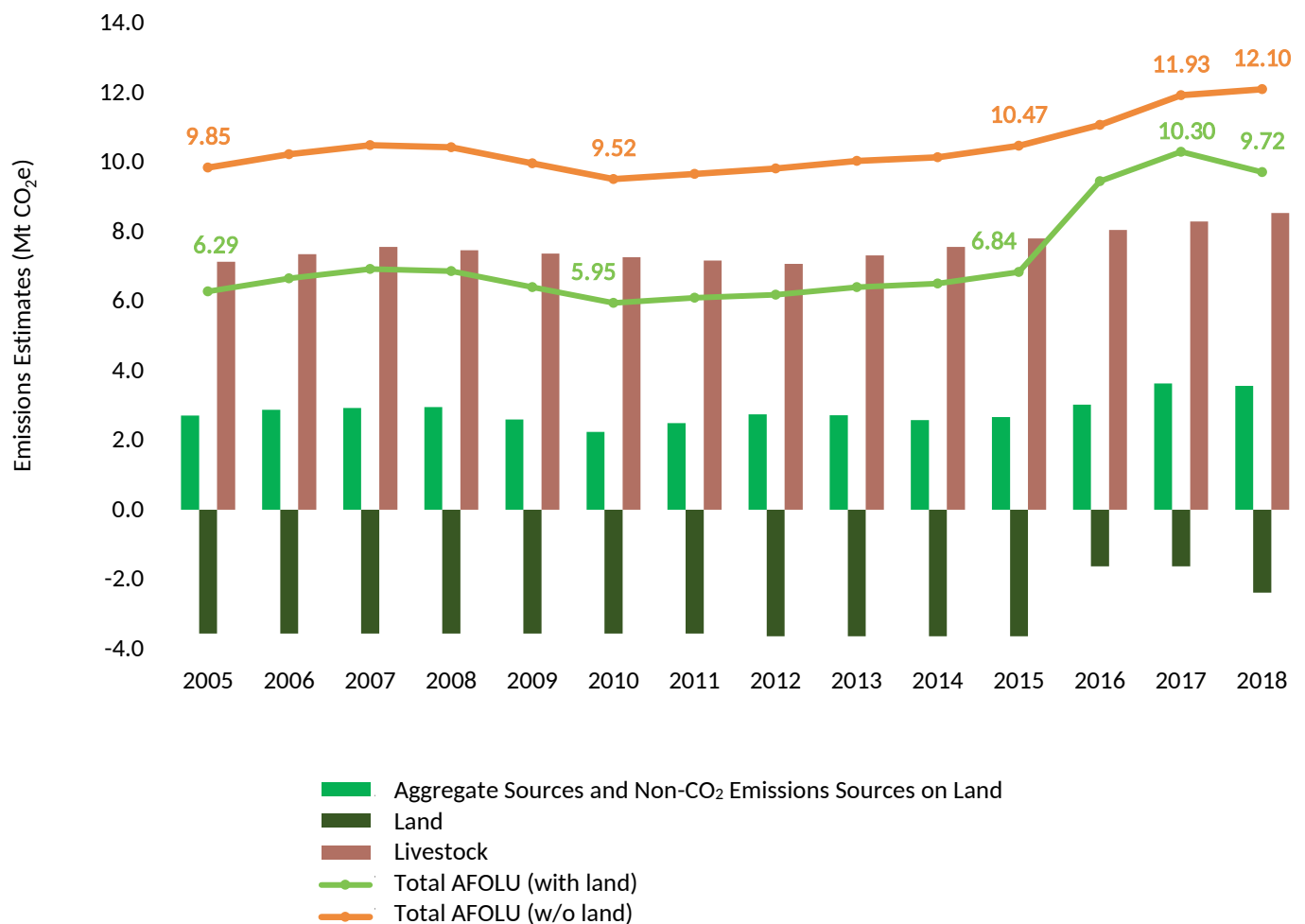
# AFOLU Sector



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<sub>2</sub> Emissions Sources on Land\*. In Jharkhand, the total AFOLU sector emissions in Jharkhand increased at a CAGR of ~3.41% from 6.29 Mt CO<sub>2</sub>e in 2005 to 9.72 Mt CO<sub>2</sub>e in 2018. While the Livestock and Aggregate Sources and Non-CO<sub>2</sub> Emissions Sources on Land sub-sectors were net GHG emitters, the Land sub-sector was a sink throughout the reference period.

As observed in Figure 10, in the Land sub-sector, there was a reduction in removals after 2015 as a result of relatively smaller quantum of increases in forest area in 2016, 2017 and 2018. The average annual removals from the Land Sub-Sector in Jharkhand during the reference period were 3.22 Mt CO<sub>2</sub>e, around 31% of the average annual gross AFOLU emissions (excluding Land sub-sector).

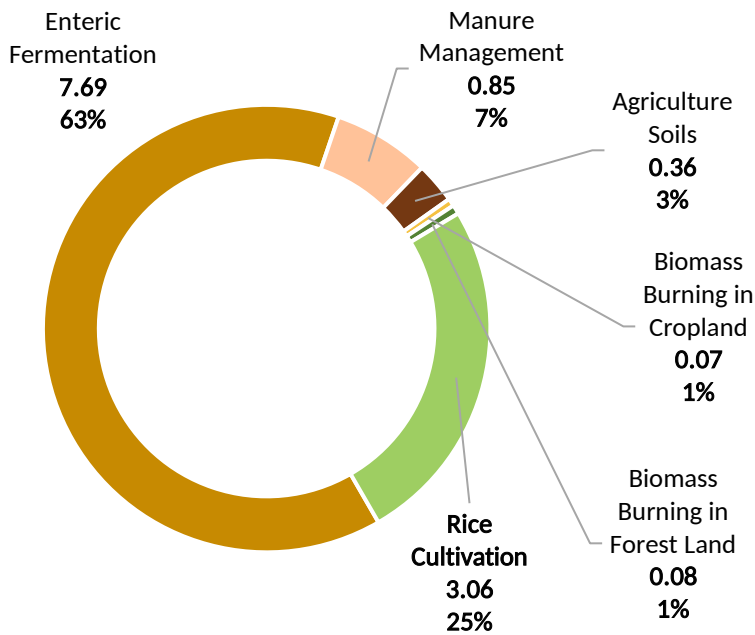
Figure 10: GHG Emissions Estimates of AFOLU Sector - Jharkhand (2005 to 2018)



\* The sub-sector called 'Aggregate Sources and Non-CO<sub>2</sub> Emissions Sources on Land' includes emissions from Rice Cultivation, Agriculture Soils, and Biomass Burning in Cropland and Forestland.



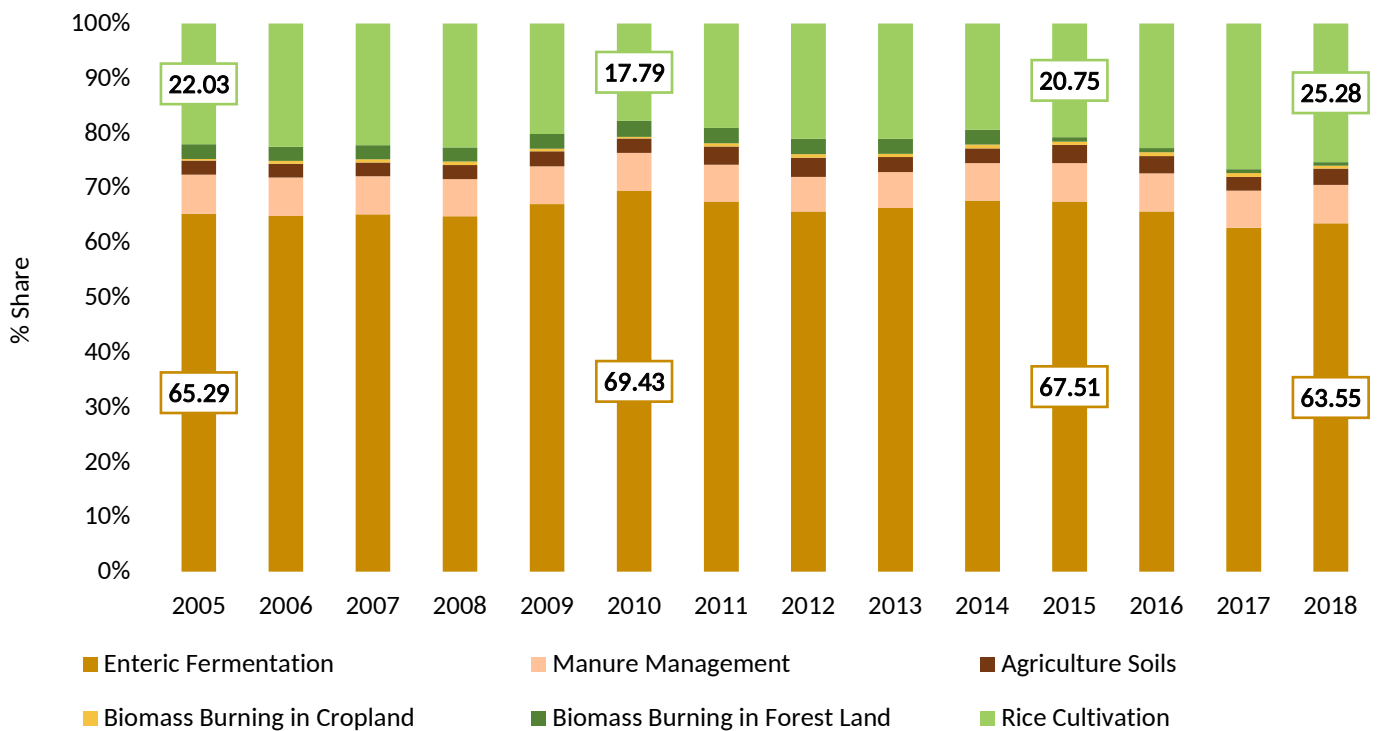
**Figure 11: Category-wise Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Gross AFOLU Emissions (excluding Land sub-sector) (2018)**



The Livestock sub-sector had the maximum share of ~71% of the gross AFOLU emissions (excluding Land sub-sector) in Jharkhand in 2018. The emissions from this sub-sector increased at a CAGR of 1.73% from 7.14 Mt CO<sub>2</sub>e in 2005 to 8.54 Mt CO<sub>2</sub>e in 2018. Within the Livestock sub-sector, Enteric Fermentation was the major contributor to gross AFOLU emissions, across the reference period, with an average share of ~66%. The emissions from this category increased at a rate of 1.38% (compounded annually) from 6.43 Mt CO<sub>2</sub>e in 2005 to 7.69 Mt CO<sub>2</sub>e in 2018.

Within the Aggregate Sources sub-sector, Rice Cultivation and Agriculture Soils were the major contributors to gross AFOLU emissions across the reference period with average shares of ~22% and ~3%, respectively.

**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. The Waste sector contributed to around 1% of total economy-wide emissions of Jharkhand in 2018. GHG emissions from the Waste sector increased at an estimated CAGR of 4.80% from 0.97 Mt CO<sub>2</sub>e in 2005 to 1.49 Mt CO<sub>2</sub>e in 2018 as seen in Figure 13.

Figure 13: GHG Emissions Estimates of Waste Sector - Jharkhand

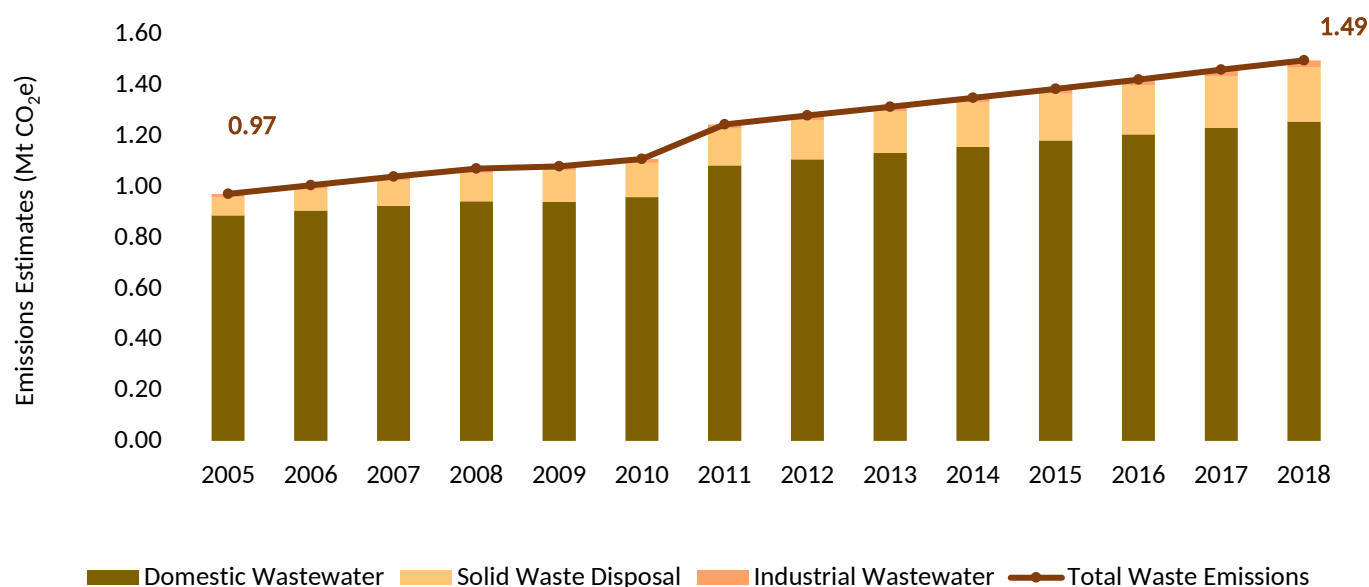
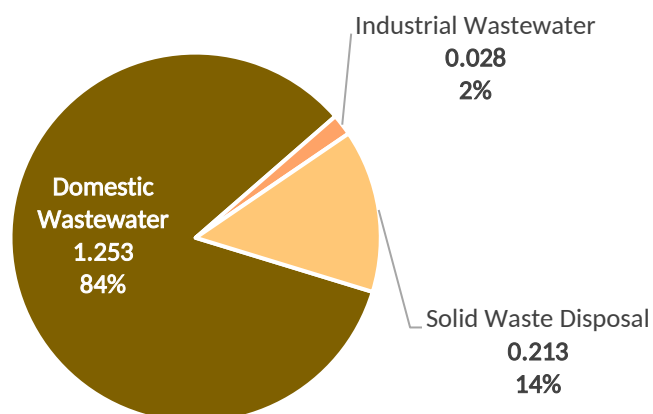


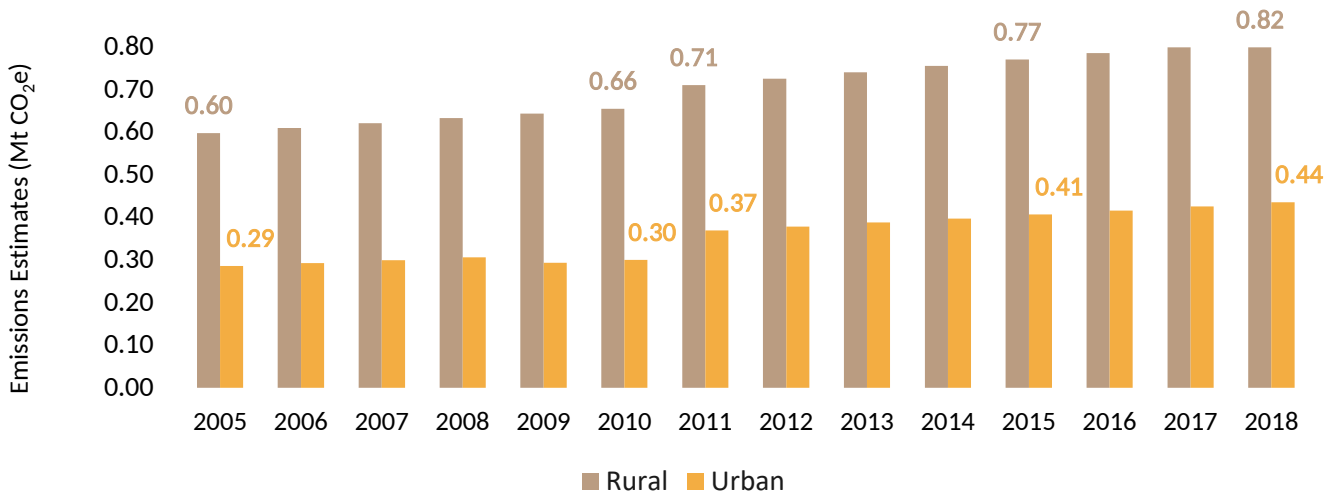
Figure 14: Sub-sector Emissions (Mt CO<sub>2</sub>e) and Percentage Share in Total Waste Sector emissions (2018)



Discharge of untreated wastewater and use of septic tanks are the key drivers of emissions due to Domestic Wastewater sub-sector. Domestic Wastewater held a major share of ~84% of the total Waste sector emissions in Jharkhand in 2018. Approximately, ~14% of total Waste sector emissions were from Solid Waste Disposal in 2018 and the emissions from this sub-sector grew at a CAGR of 8.74% from 0.07 Mt CO<sub>2</sub>e in 2005 to 0.21 Mt CO<sub>2</sub>e in 2018. Industrial Wastewater accounted for ~2% of total Waste emissions, which increased at a CAGR of 6.36% from ~0.01 Mt CO<sub>2</sub>e in 2005 to ~0.03 Mt CO<sub>2</sub>e in 2018 (see Figures 13 and 14).

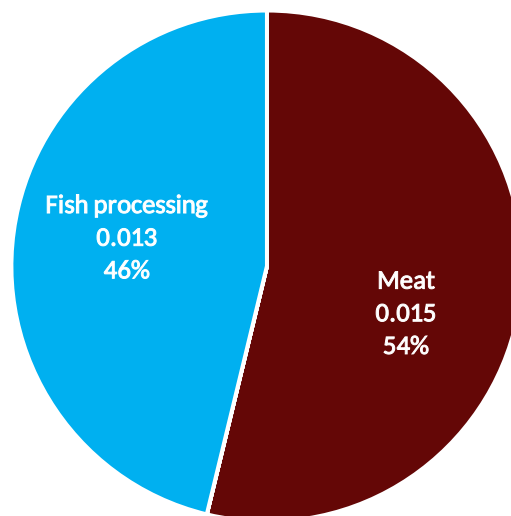
Emissions due to Domestic Wastewater from both rural and urban areas grew at a CAGR of 2.71% from 0.88 Mt CO<sub>2</sub>e in 2005 to 1.25 Mt CO<sub>2</sub>e in 2018. Almost ~65% of the Domestic Wastewater emissions were from the rural areas of Jharkhand in 2018 as shown in Figure 15.

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



Meat Industry, was the major contributor to Industrial Wastewater emissions with a share of ~54% in Jharkhand, followed by Fish Processing, with a share of 46% in 2018.

Figure 16: Category-wise Emissions (Mt CO<sub>2</sub>e) 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.

Secretariat Contact

Vasudha Foundation, CISRS House, 14, Jangpura B,  
Mathura Road, New Delhi - 110014, India  
Phone No. - 011-24372680