

Trend Analysis of GHG Emissions of ARUNACHAL PRADESH

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

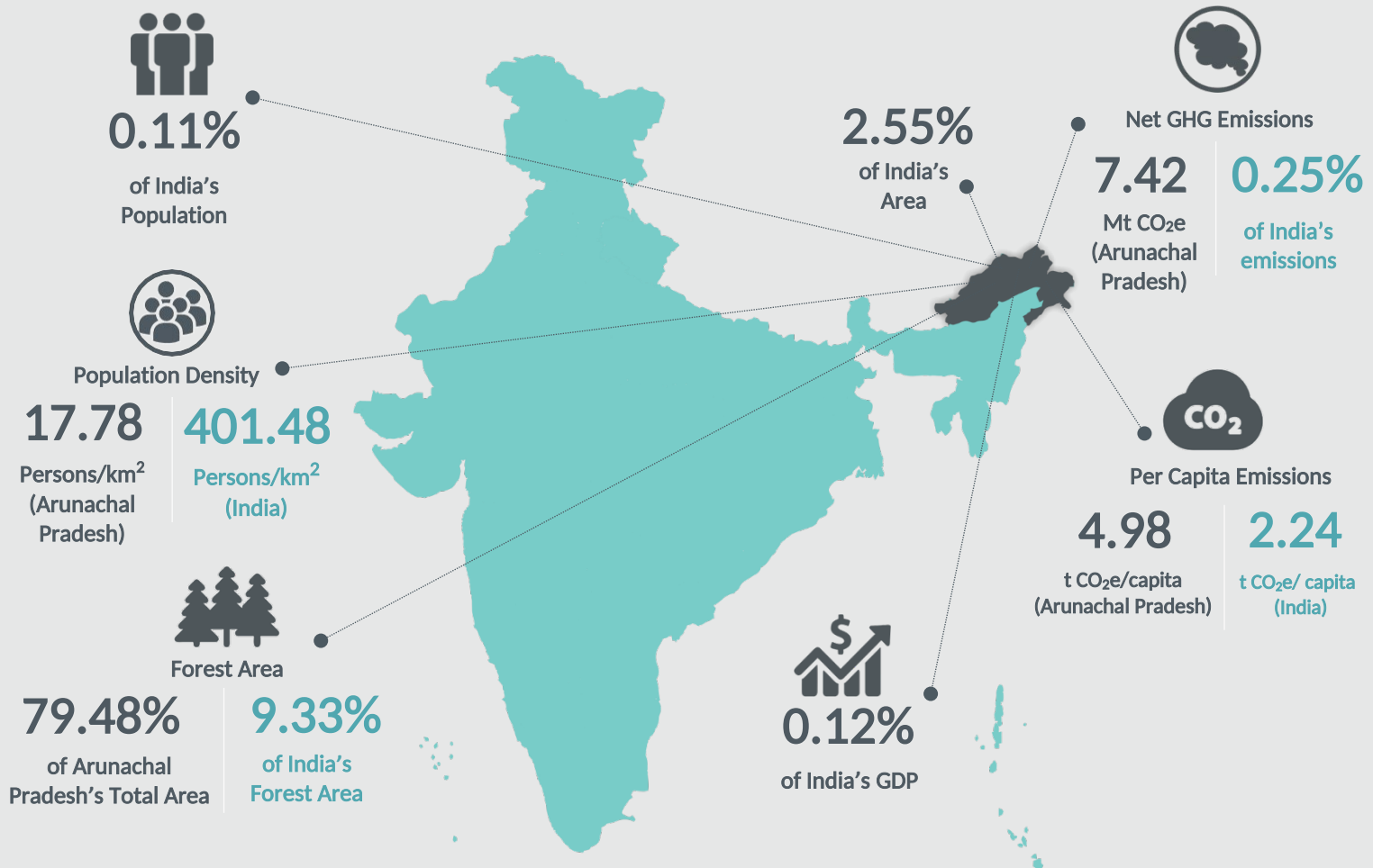
The Platform seeks to add value to the various ongoing GHG emissions estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

Arunachal Pradesh at a Glance (2018)

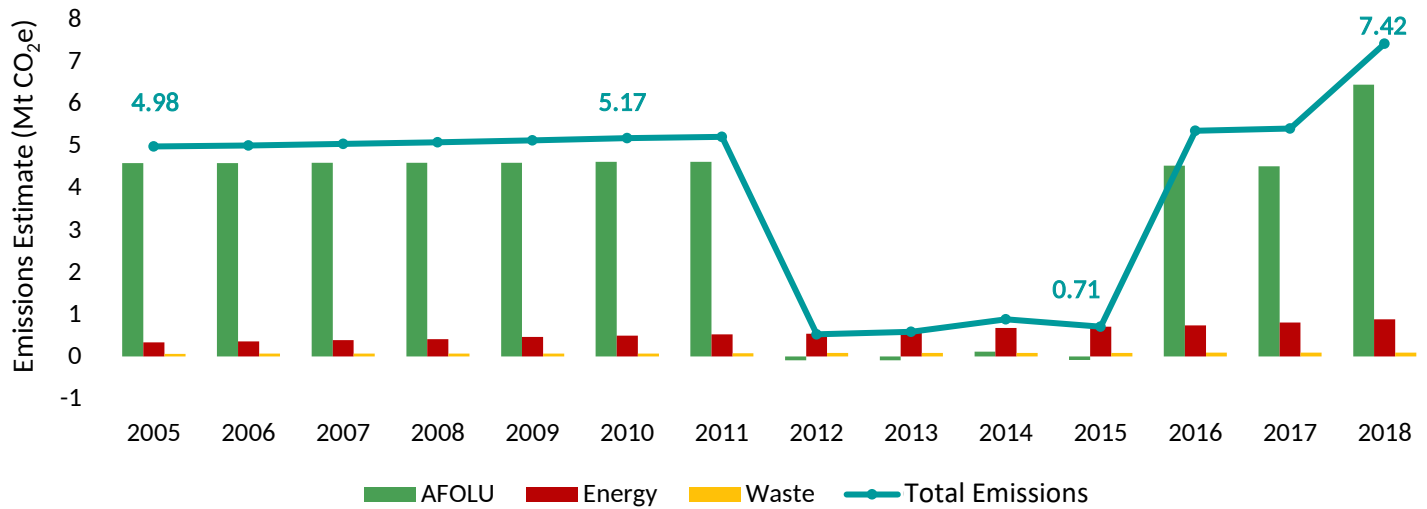


*Mt CO₂e – Million Tonnes of Carbon Dioxide Equivalent | CAGR – Compound Annual Growth Rate

*The map represents the data for 2018

Economy-wide Emissions Estimates

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



Emissions of Arunachal Pradesh increased at an estimated CAGR of 3.12% from 4.98 Mt CO₂e in 2005 to 7.42 Mt CO₂e in 2018. The Agriculture, Forestry and Other Land-Use (AFOLU) sector was the major contributor to the Arunachal Pradesh's total emissions across the reference years. However, between 2012 and 2015, the total emissions significantly reduced owing to increased CO₂ removals from the Land category of AFOLU sector (see Figure 1).

In 2005, the share of AFOLU sector in total economy-wide emissions in Arunachal Pradesh was ~92%, while Energy sector accounted for ~7%. However, in 2018, share of AFOLU sector reduced to ~87%, whereas Energy sector increased to 12%. As illustrated in Figure 2, the share of emissions from the Waste sector accounted for ~1%, in both 2005 and 2018.

No emissions from IPPU were reported in Arunachal Pradesh throughout the reference period.

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

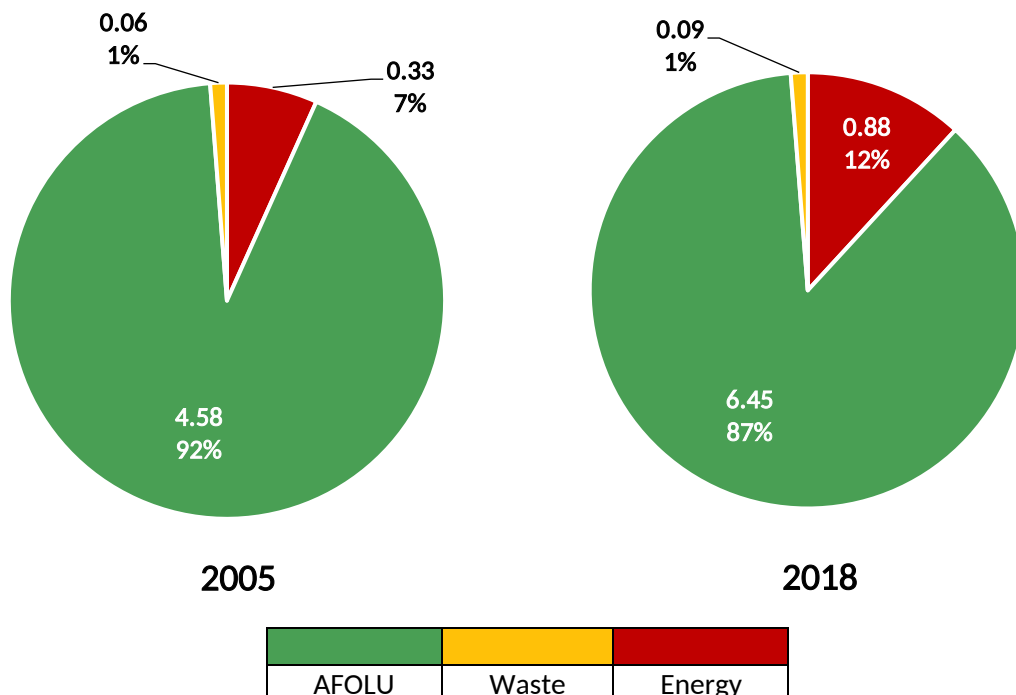
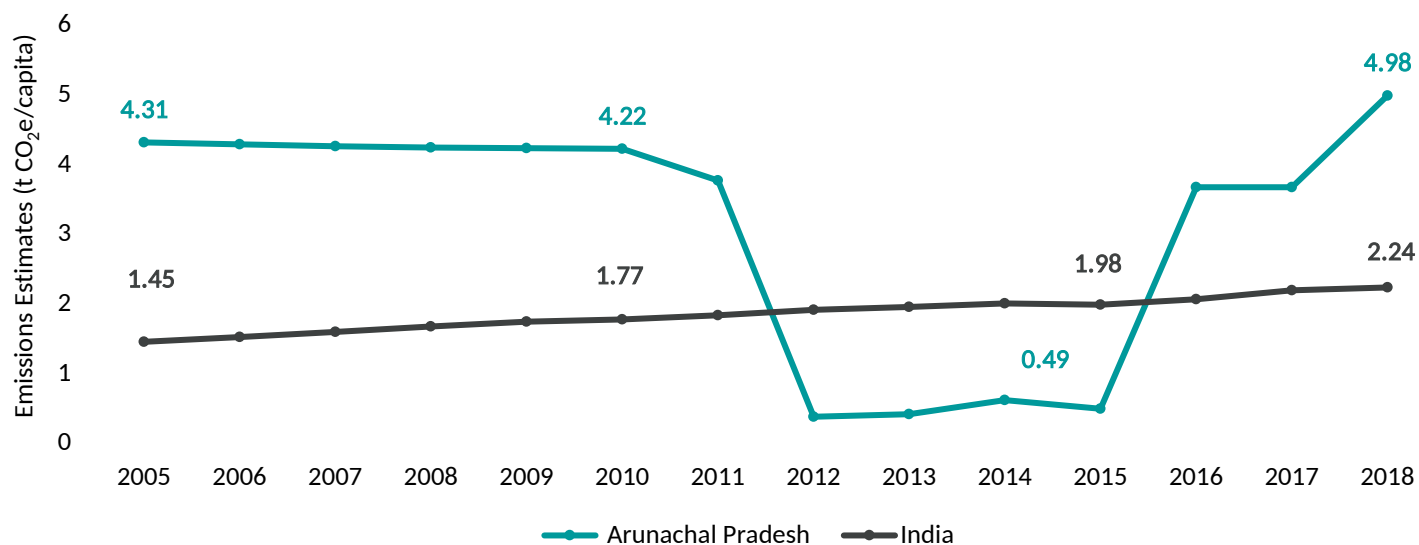


Figure 3: Per Capita GHG Emissions of Arunachal Pradesh and India (2005 to 2018)



The per capita emissions of Arunachal Pradesh were higher as compared to India's per capita emissions, across the reference years, except from 2012 to 2015 (see Figure 3), due to increased CO₂ removals from the AFOLU sector during this period. The per capita emissions of Arunachal Pradesh increased at a CAGR of 1.12% from 4.31 t CO₂e/capita in 2005 to 4.98 t CO₂e/capita in 2018, which was lower than India's CAGR (~3.41%).

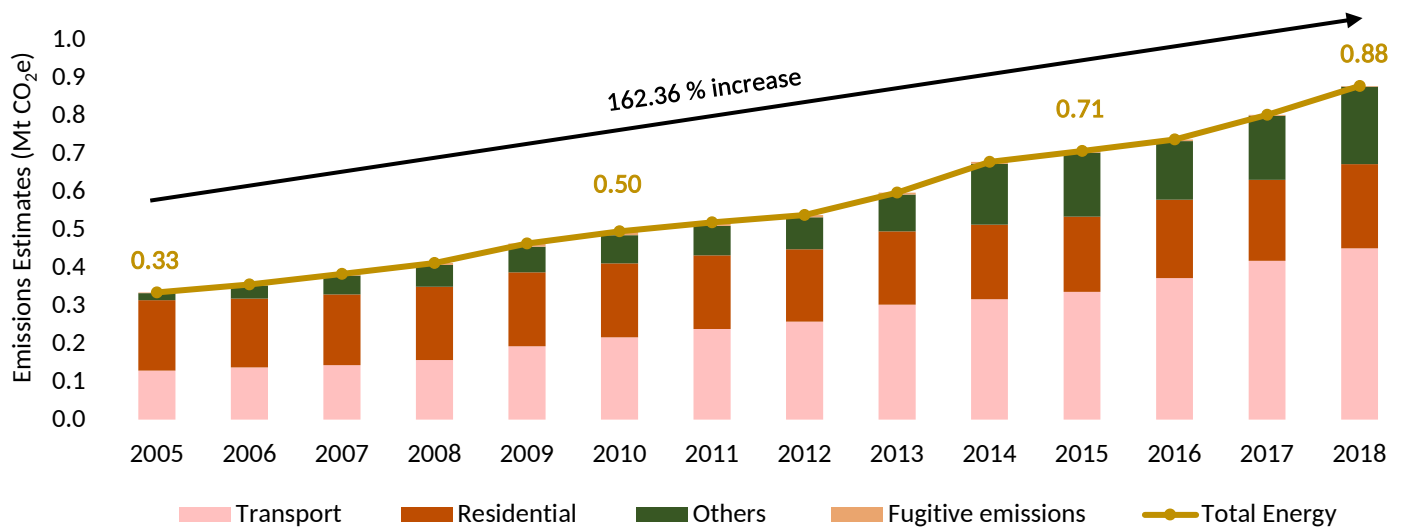
Energy Sector



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

The Energy sector of Arunachal Pradesh accounted for ~12% of the total economy-wide emissions in 2018. The emissions from the Energy sector grew at a CAGR of ~7.70% from 0.33 Mt CO₂e in 2005 to 0.88 Mt CO₂e in 2018 (see Figure 4).

Figure 4: GHG Emission Estimates of Energy Sector- Arunachal Pradesh (2005 to 2018)



Within the Energy sector, Transport category was the major contributor to the GHG emissions with a share of ~52% in 2018. This was followed by Residential and Industrial Energy categories with shares of ~25% and ~14%, respectively (see Figure 5).

Within the Fuel Combustion sub-sector, Liquid Petroleum Fuels were the major contributor to GHG emissions across the reference years, with an average share of ~62%, during the reference period. This was followed by emissions from Other Fuels (Charcoal and Fuelwood), with an average share of ~16% between 2005 and 2018. Gaseous Petroleum Fuels had an average share of ~12%, while Coal contributed ~10% to the Fuel Combustion emissions during the reference years (see Figure 6).

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

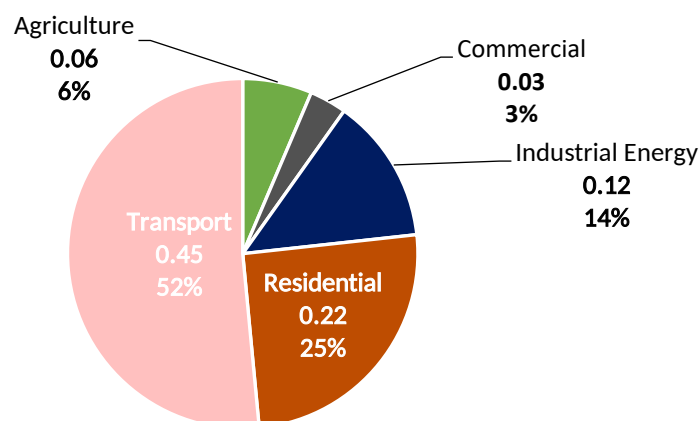
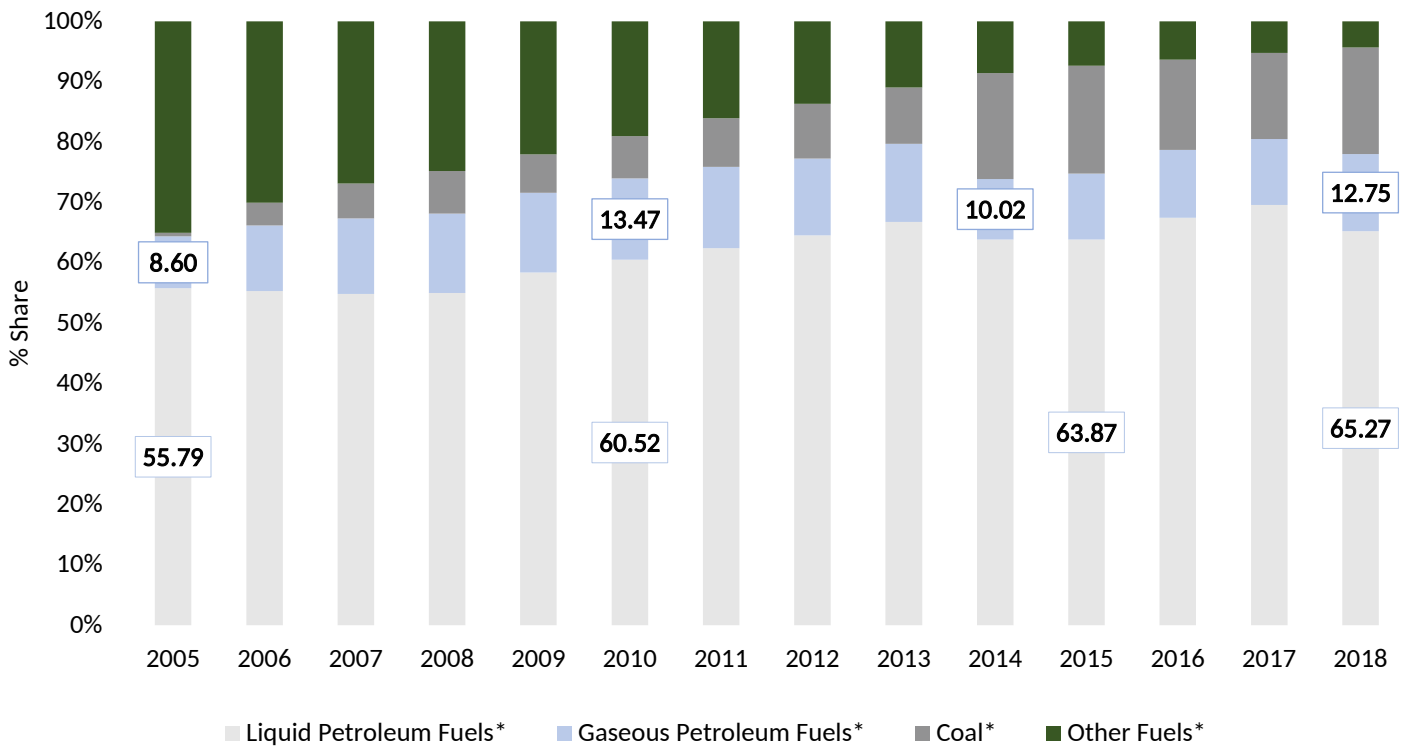


Figure 6: Percentage Share of GHG Emissions by Fuel Type due to Fuel Combustion in Energy Sector (2005 to 2018)





IPPU Sector

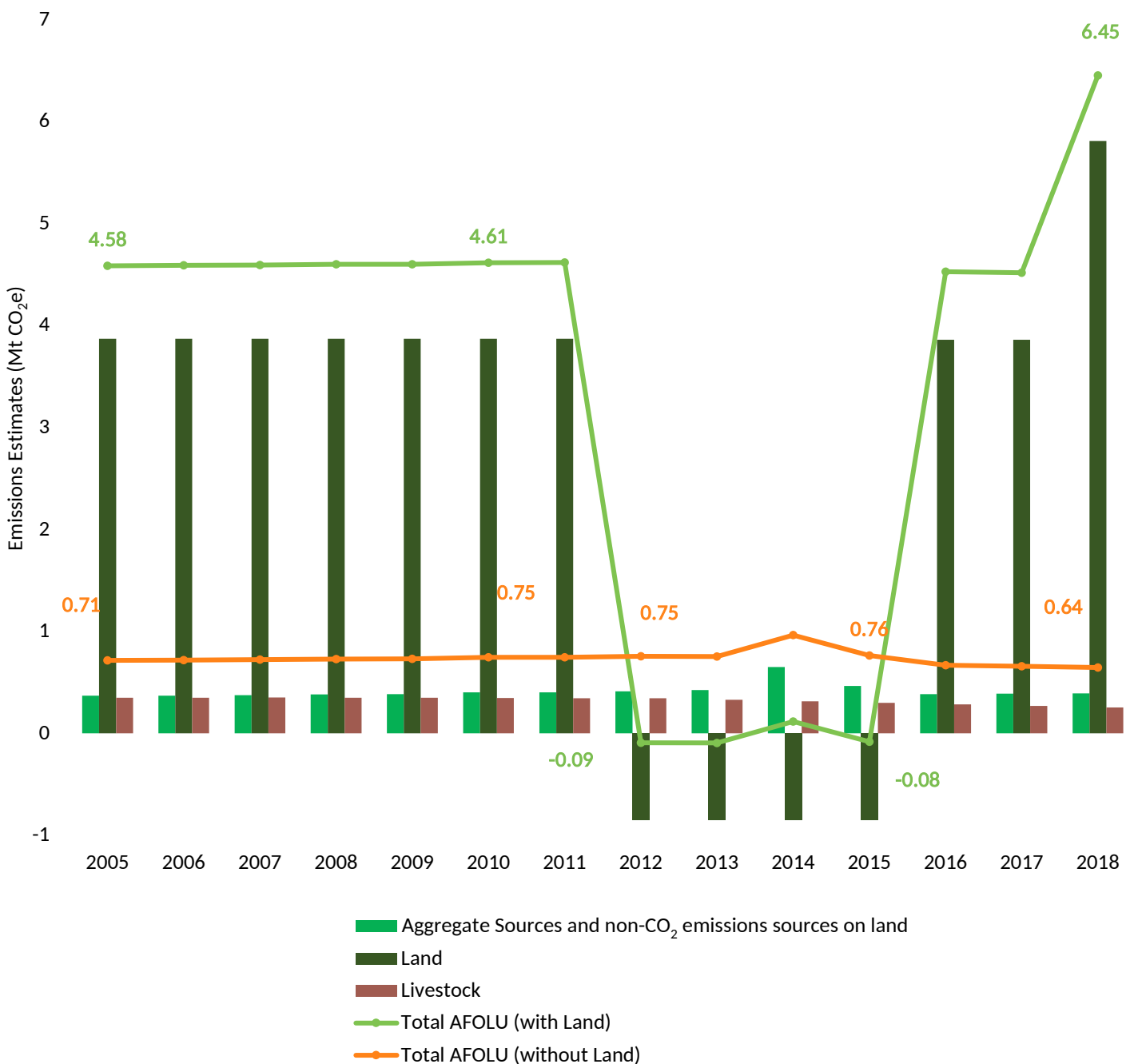
Emissions from the Industrial Processes and Product Use (IPPU) sector are largely driven by Chemical, Metal, Mineral Industries and Non-Energy Products from Fuels and Solvent Use. Industrial activities as listed by IPCC to be responsible for GHG emissions were not present in Arunachal Pradesh. Therefore, no IPPU emissions were registered in Arunachal Pradesh throughout the reference period.



AFOLU Sector

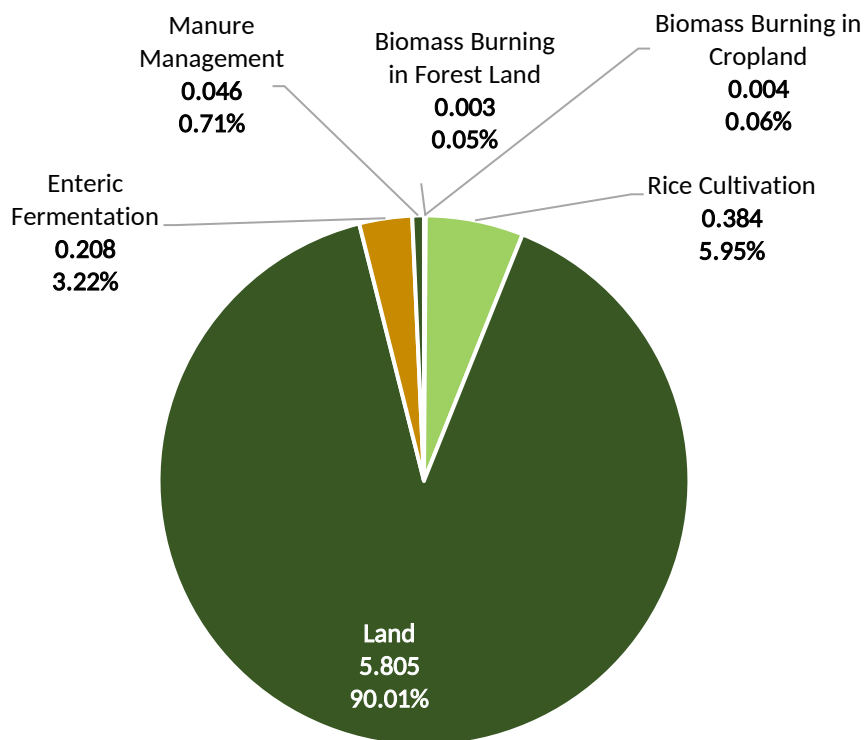
Emissions from the Agriculture, Forestry and Other Land Use (AFOLU) sector arise from three main sub-sectors, namely Livestock, Land and Aggregate Sources and Non-CO₂ Emissions Sources on Land*. In Arunachal Pradesh, AFOLU sector represented ~87% of the total emissions in 2018. The AFOLU emissions grew at CAGR of 2.66% from 4.58 Mt CO₂e in 2005 to 6.45 Mt CO₂e in 2018. Land sub-sector was the major emitter across the reference years and its emissions grew at a CAGR of 3.17% from 3.87 Mt CO₂e in 2005 to 5.81 Mt CO₂e in 2018. However, a significant dip was observed from 2012 to 2015 which can be attributed to the increase in the sink from the Other Land category. Further, a jump in overall emissions was observed post 2015 due to increased emissions from Forest Land category caused by a relatively larger reduction in forest area as reported by FSI (2019 and 2021)** (see Figure 7).

Figure 7: GHG Emission Estimates of AFOLU Sector - Arunachal Pradesh (2005-2018)



In 2018, Land sub-sector was the major contributor to total AFOLU emissions with a share of 90.01%. This was followed by Rice Cultivation and Enteric Fermentation categories, with shares of 5.95% and 3.22%, respectively (see Figure 8).

Figure 8: Sub-sector/ Category-wise Emissions (Mt CO₂e) and Percentage Share in Total AFOLU Emissions (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 2019 reports data for 2017 and FSI Report 2021 reports data for 2019

Waste Sector



Solid Waste Disposal, Domestic Wastewater and Industrial Wastewater are the key sources of GHG emissions in the Waste sector. In Arunachal Pradesh, Waste sector accounted for ~1% of the total GHG emissions, in 2018. The emissions from the Waste sector grew at a CAGR of 3.24% from 0.06 Mt CO₂e in 2005 to 0.09 Mt CO₂e in 2018 (see Figure 9). A slight dip in the total Waste sector emissions was observed in 2009, due to the reduction in emissions from Domestic Wastewater emissions, but they began to rise again from 2011 onwards.

Figure 9: GHG Emission Estimates of Waste Sector - Arunachal Pradesh (2005 to 2018)

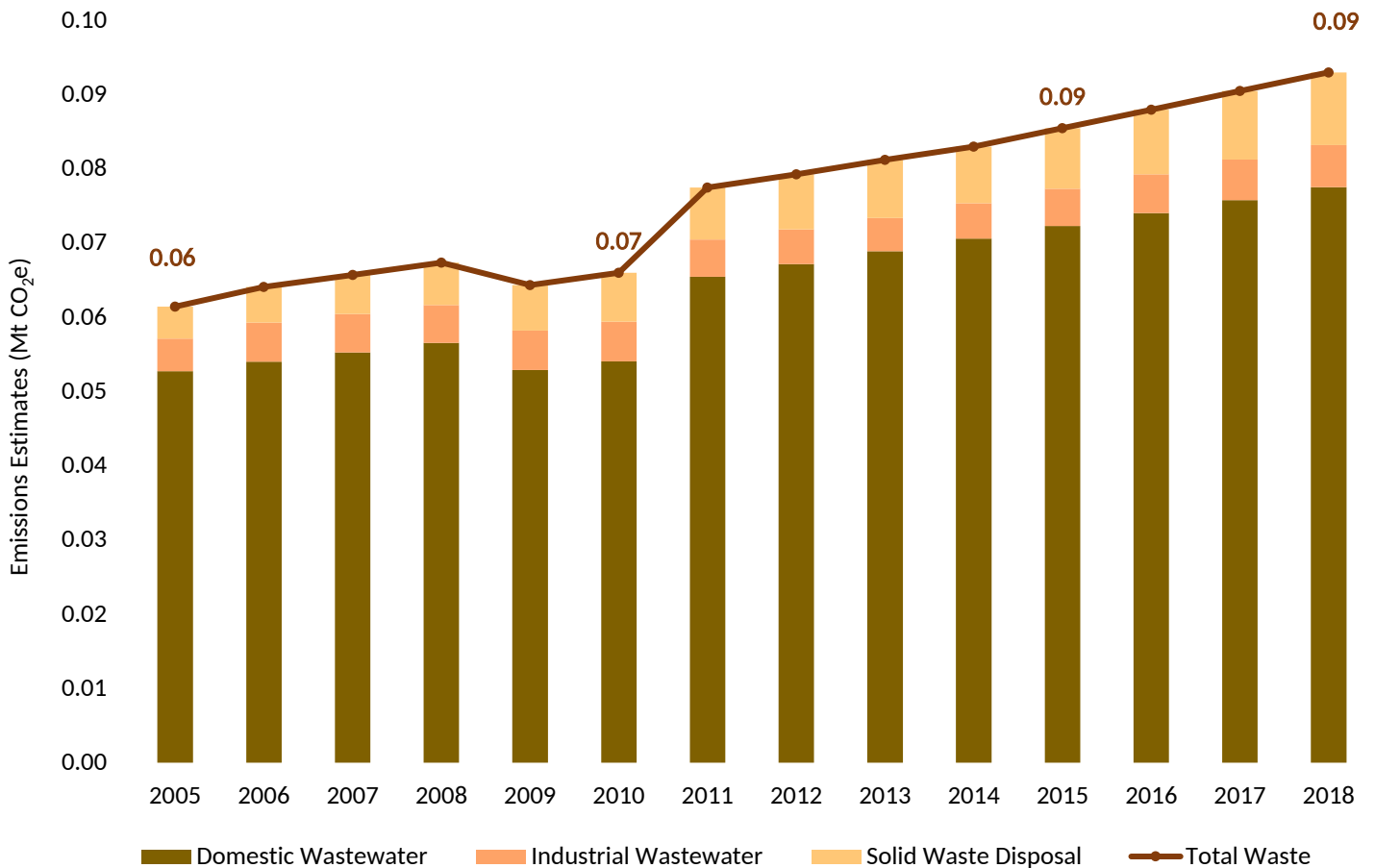
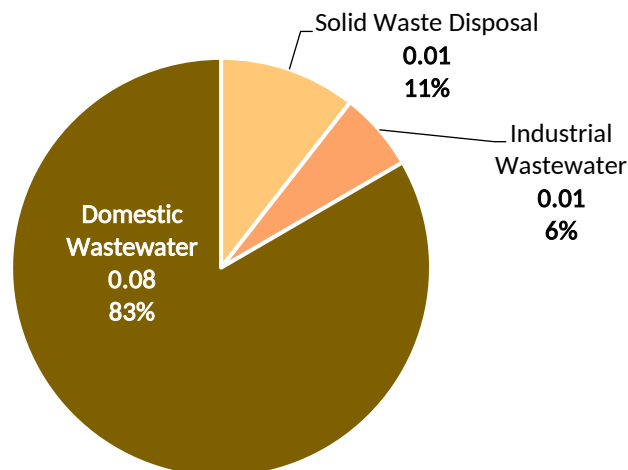


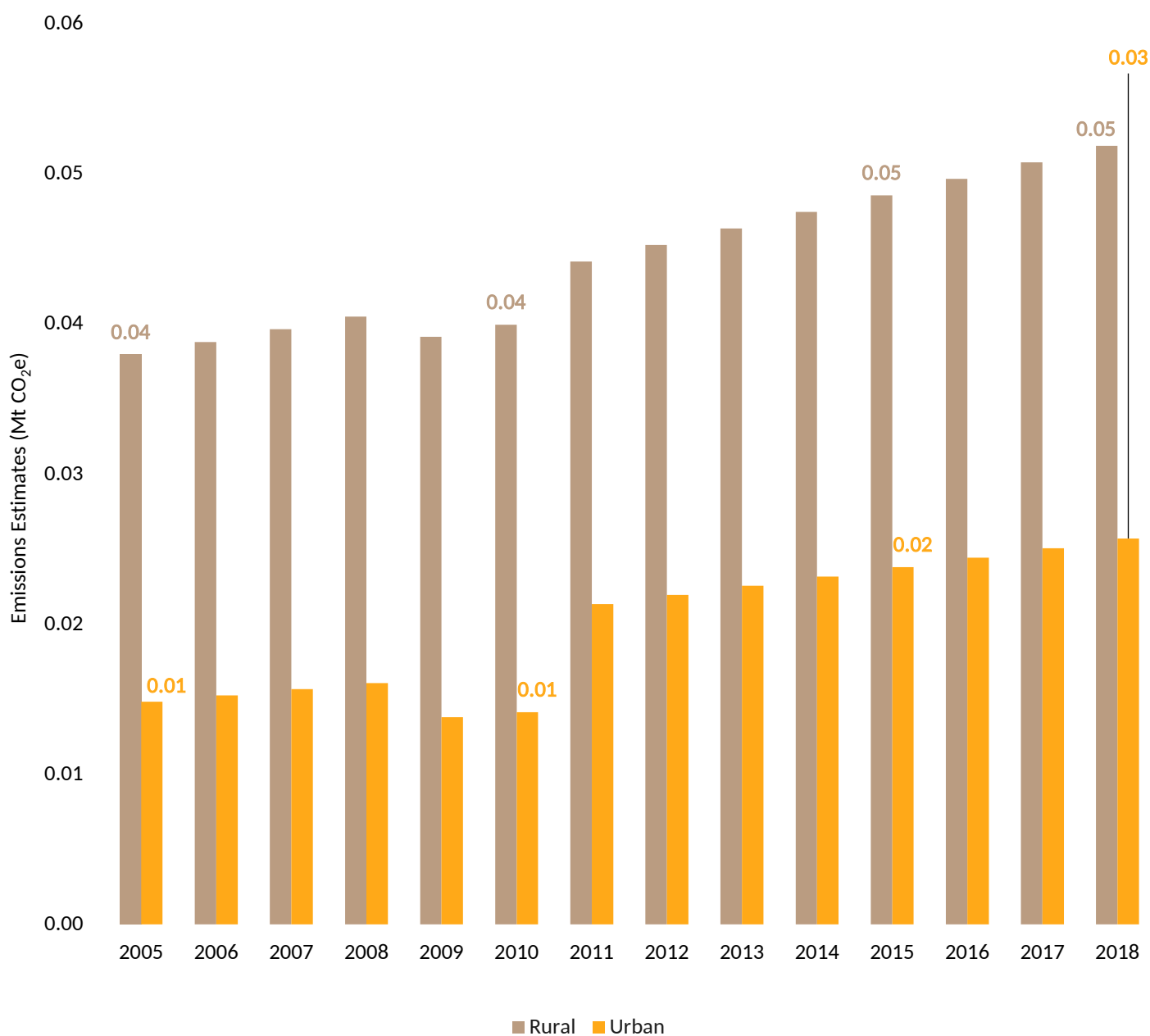
Figure 10: Sub-sector emissions (Mt CO₂e) and Percentage Share in Total Waste Sector Emissions (2018)



Discharge of untreated wastewater and use of septic tanks are key drivers of emissions of Domestic Wastewater sub-sector. Domestic Wastewater contributed ~83% to the total Waste emissions of Arunachal Pradesh in 2018. Approximately ~11% of the total Waste sector emissions were from the Solid Waste Disposal in 2018 and the emissions grew at CAGR of 6.52% from 0.004 Mt CO₂e in 2005 to 0.010 Mt CO₂e in 2018. Industrial Wastewater accounted ~6% of the Waste sector emissions which grew at a CAGR of 2.01% from 0.004 Mt CO₂e 2005 to 0.006 Mt CO₂e 2018 (see Figure 10).

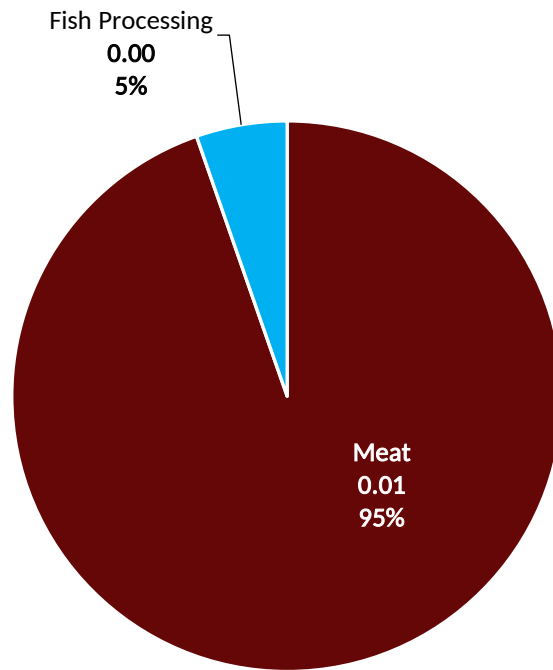
The emissions from the Domestic Wastewater of both rural and urban areas grew at an estimated CAGR of 3.01% from 0.05 Mt CO₂e in 2005 to 0.08 Mt CO₂e in 2018. Almost ~67% of the Domestic Wastewater emissions emanated from rural areas of Arunachal Pradesh in 2018 (see Figure 11).

Figure 11: Area-wise GHG Emissions Estimates of Domestic Wastewater (2005 to 2018)



Meat industry was the major contributor to the Industrial Wastewater emissions with a share of ~95%, followed by Fish Processing, with a share of ~5%, as illustrated in Figure 12.

Figure 12: 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.

Secretariat Contact

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