GHG Platform INDIA

Trend Analysis of GHG Emissions of DADRA and NAGAR HAVELI

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

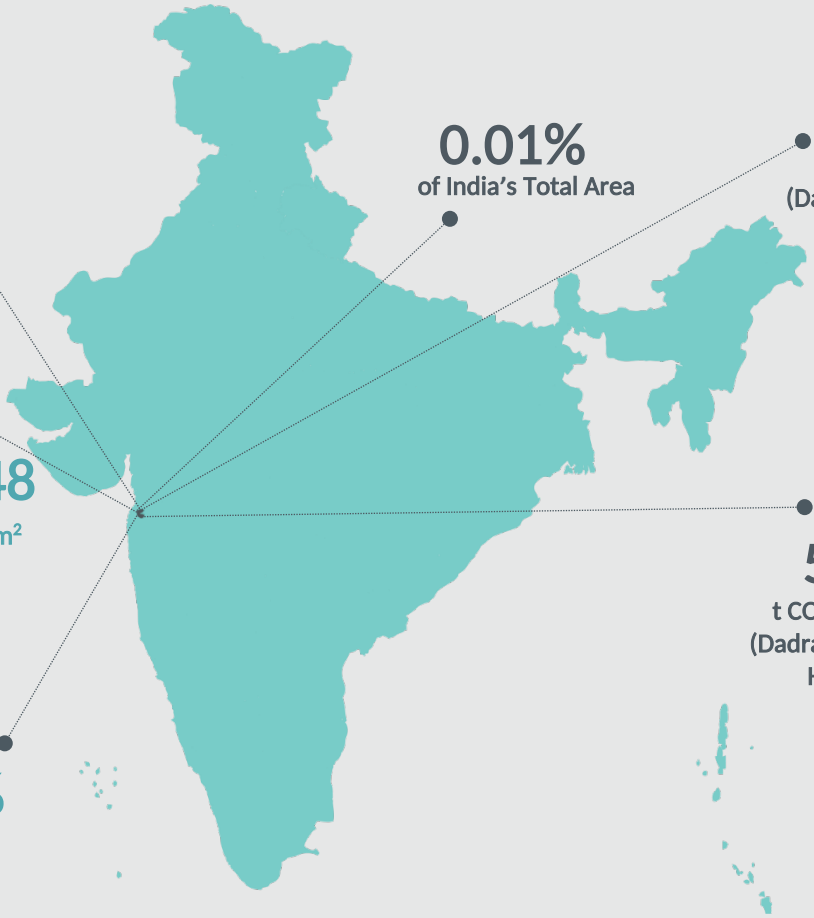
The Platform seeks to add value to the various ongoing GHG emissions estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories to state inventories, and by increasing the volume of analytics and policy dialogue on India's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

Dadra and Nagar Haveli at a Glance (2018)



0.02% of India's Population

0.01% of India's Total Area

Net GHG Emissions
1.74 Mt CO_2e (Dadra and Nagar Haveli)
0.06% of India's Emissions

Population Density
651.73 Persons/km² (Dadra and Nagar Haveli)
401.48 Persons/km² (India)

Per Capita Emissions
5.44 t CO_2e/capita (Dadra and Nagar Haveli)
2.24 t CO_2e/capita (India)

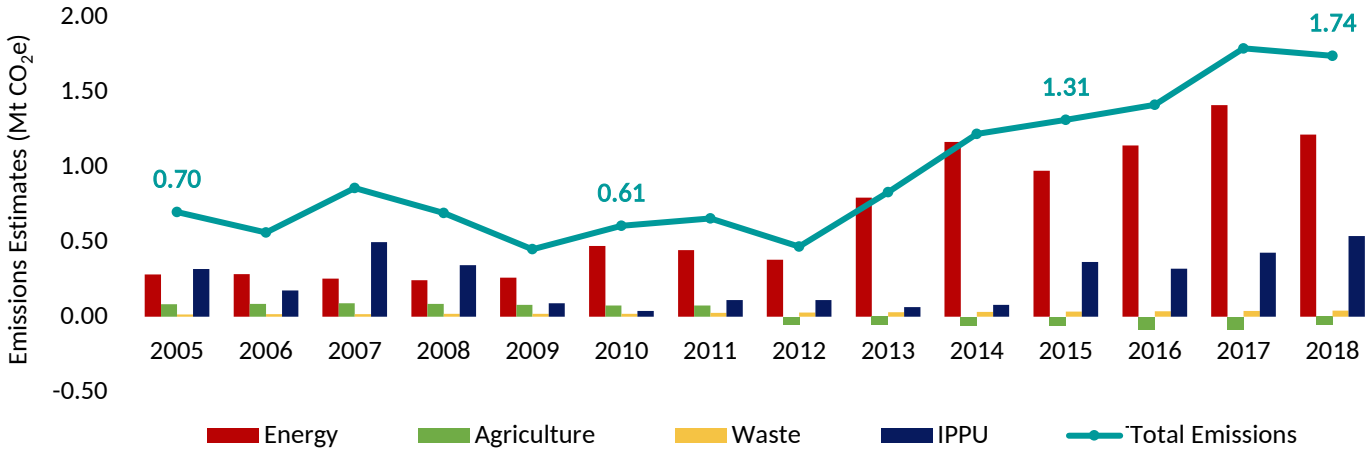
Forest Area
41.90% of Dadra and Nagar Haveli's Total Area
0.03% of India's Forest Area

*The map represents the data for 2018
* The map does not represent administrative boundaries

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

Economy-wide Emissions Estimates

Figure 1: GHG Emissions Estimates of Dadra and Nagar Haveli (2005 to 2018)

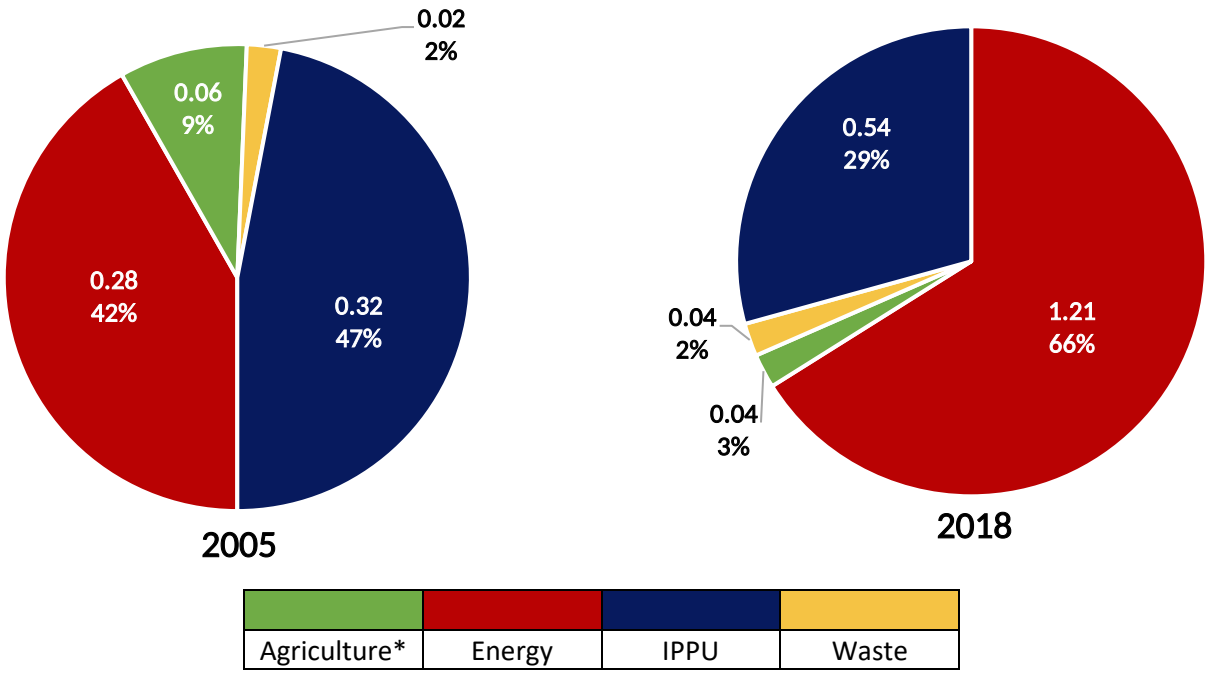


Emissions of Dadra and Nagar Haveli increased at a rate of 7.27% (compounded annually) from 0.70 Mt CO_2e in 2005 to 1.74 Mt CO_2e in 2018. The total economy-wide emissions of the UT witnessed a few peaks and troughs throughout the reference period due to changes in emissions from Energy and IPPU sectors (see Figure 1).

It is important to note that the entire Agriculture, Forestry and Land Use (AFOLU) sector was a net emitter till 2011 and became a net sink from 2012.

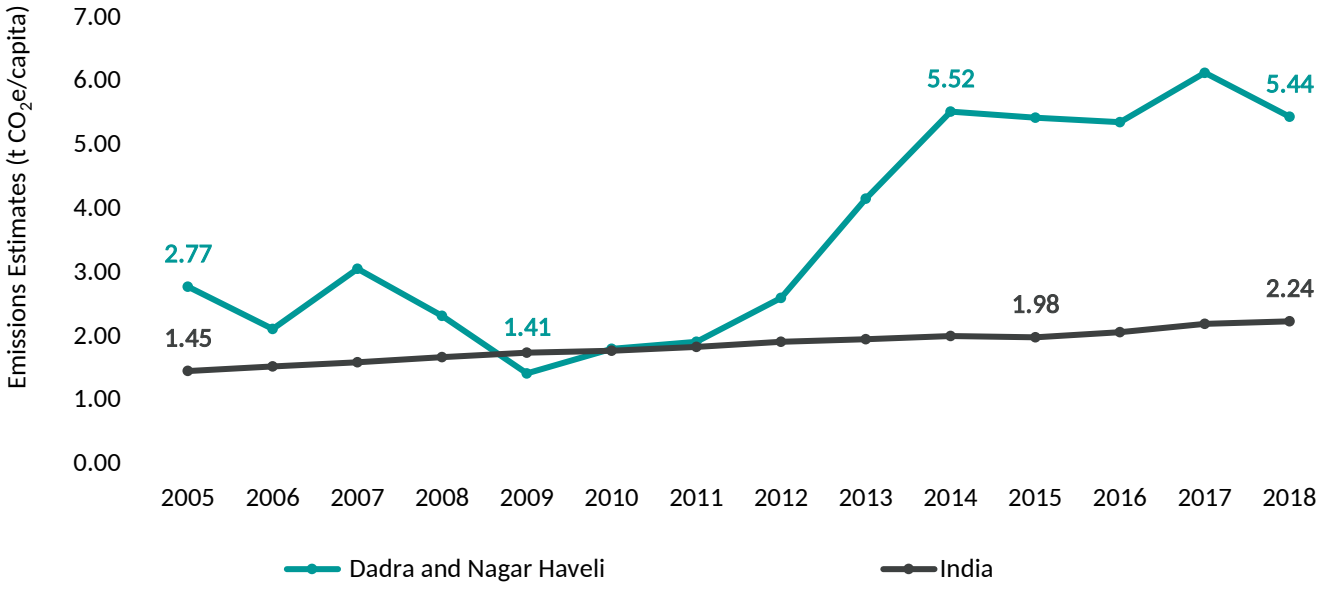
In 2005, the share of IPPU sector in gross economy-wide emissions (excluding Land sub-sector in AFOLU) was ~47%. This was followed by Energy (~42%), Agriculture (~9%) and Waste (~2%) sectors. In 2018, the share of Energy sector emissions increased to ~66% of the gross economy-wide emissions (excluding Land sub-sector in AFOLU). While, the share of Industrial Processes and Product Use (IPPU) and Agriculture decreased to ~29% and ~3%, the share of Waste sector remained nearly the same at ~2% in 2018 (see Figure 2).

Figure 2: Sector-wise Contribution (Mt CO_2e) and Percentage Share in Gross Economy-wide GHG Emissions (excluding Land sub-sector in AFOLU) of Dadra and Nagar Haveli



For the purpose of this comparison, Agriculture emissions do not include removals from lands and forests. For further details, please see the section on AFOLU emissions below.

Figure 3: Per Capita Net GHG Emissions of Dadra and Nagar Haveli and India (2005 to 2018)



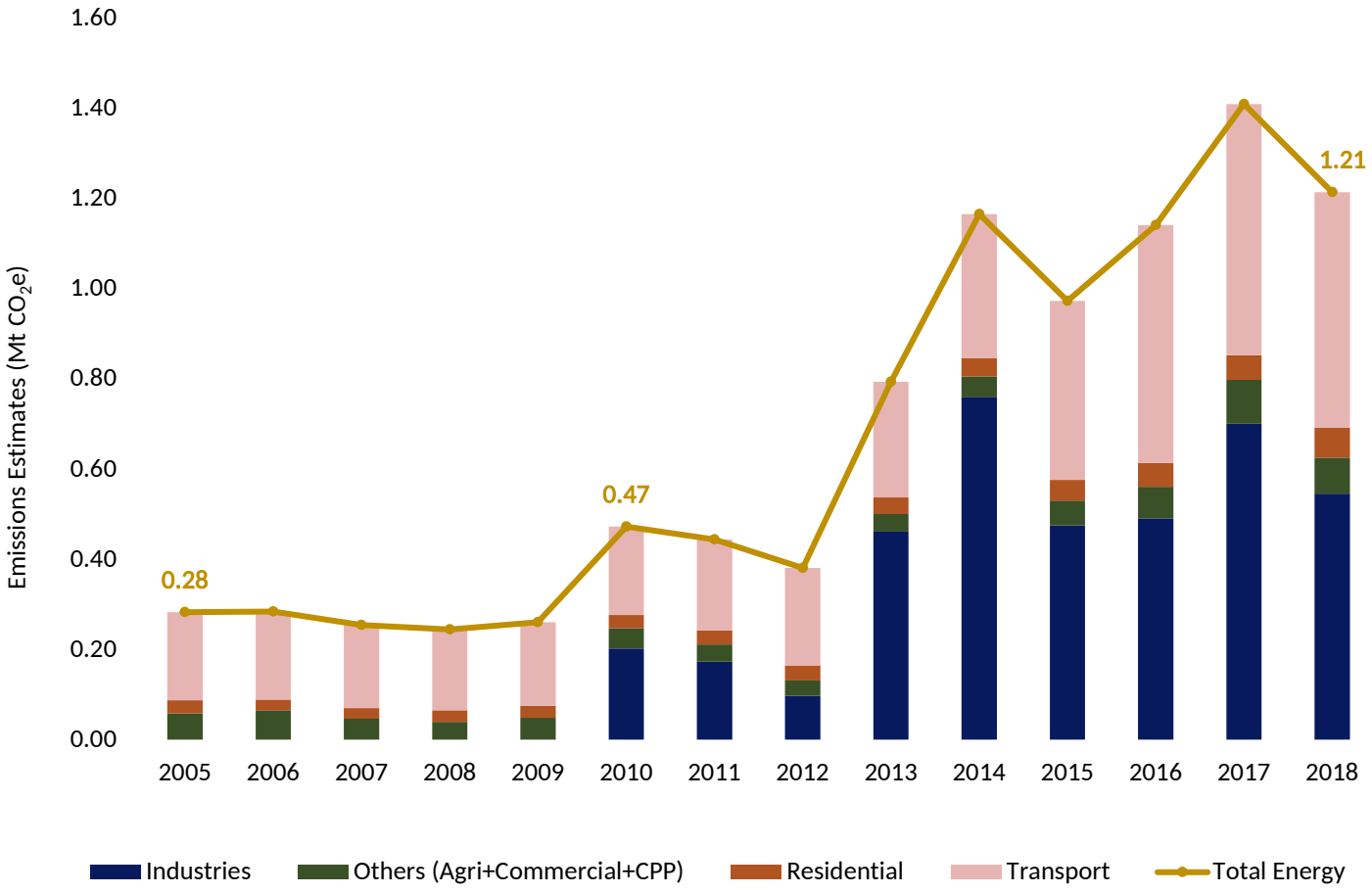
The per capita emissions of Dadra & Nagar Haveli remained mostly higher than that of India during the reference period, except in 2009 when the UT recorded its lowest per capita emissions due to a large decline in emissions from the Energy sector. These emissions almost doubled at a CAGR of 5.32% from 2.77 t CO_2e/capita in 2005 to 5.44 t CO_2e/capita in 2018, which was much higher than that of India (~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.

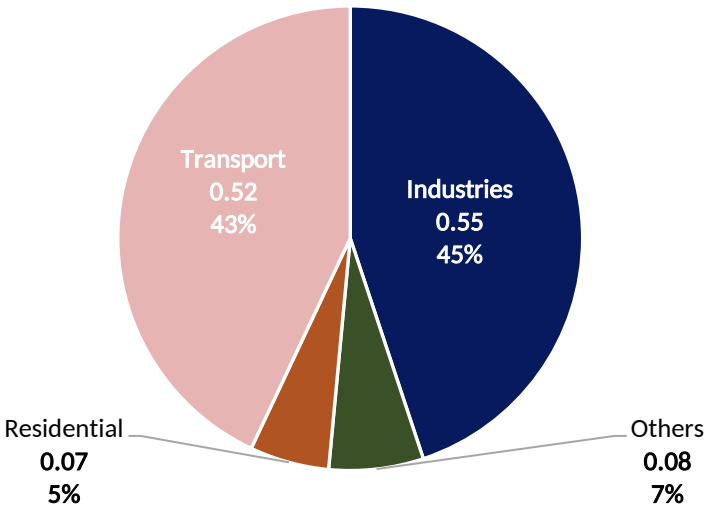
In Dadra and Nagar Haveli, the Energy sector contributed 66% to the gross economy-wide emissions (excluding Land sub-sector within AFOLU) in 2018. The UT registered emissions only from the Fuel Combustion sub-sector. The overall emissions from the Energy sector increased 4-fold, at a CAGR of 11.87% from 0.28 Mt CO_2e in 2005 to 1.21 Mt CO_2e in 2018 (Figure 4).

Figure 4: GHG Emissions Estimates of Energy Sector - Dadra and Nagar Haveli (2005 to 2018)



Within the Energy sector, the category of Industrial Energy was the major contributor to GHG emissions with a share of ~45% of the total Energy emissions in 2018. This was followed by Transport and Residential categories with shares of 43% and 7%, respectively (see Figure 5).

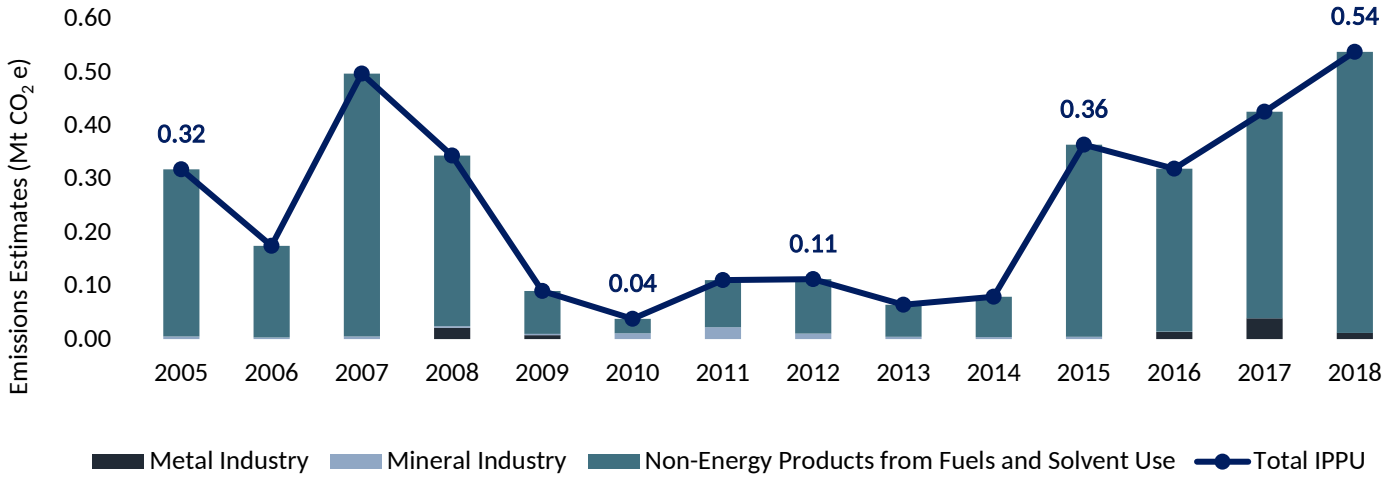
Figure 5: Category-wise Emissions (Mt CO_2e) and Percentage Share in Total Energy Sector Emissions (2018)



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. The IPPU sector represented ~29% of the gross economy-wide emissions (excluding Land sub-sector within AFOLU) of Dadra & Nagar Haveli in 2018. Between 2005 and 2018, the overall IPPU emissions grew at a CAGR of 4.14% from 0.32 Mt CO_2e in 2005 to 0.54 Mt CO_2e in 2018. Emissions from Non-Energy Products from Fuels and Solvent Use sub-sector were the highest throughout the reference period, followed by Metal Industry and Mineral Industry sub-sectors. The IPPU sector witnessed a few peaks and troughs throughout the reference period due to changes in emissions from the Non-Energy Products sub-sector (see Figure 6).

Figure 6: GHG Emissions Estimates of IPPU Sector - Dadra and Nagar Haveli (2005 to 2018)



In 2018, Lubricant Use category was a key contributor to overall IPPU sector emissions, it accounted for a ~97% share in emissions from the sector. The other contributing categories were Glass Production and Other Uses of Soda Ash (see Figures 7 and 8).

Figure 7: Sub-Sector Emissions (Mt CO_2e) and Percentage Share in Total IPPU Emissions (2018)

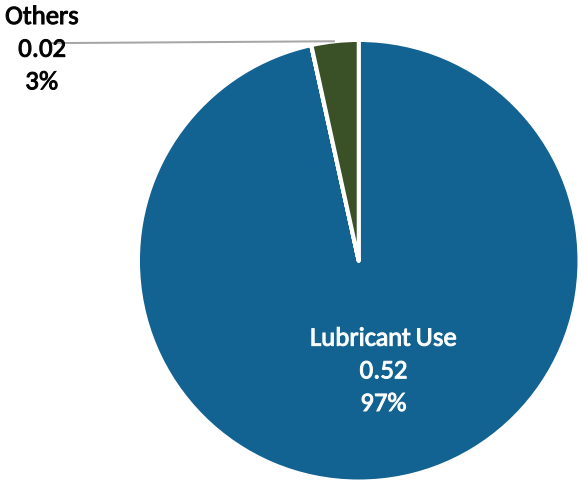
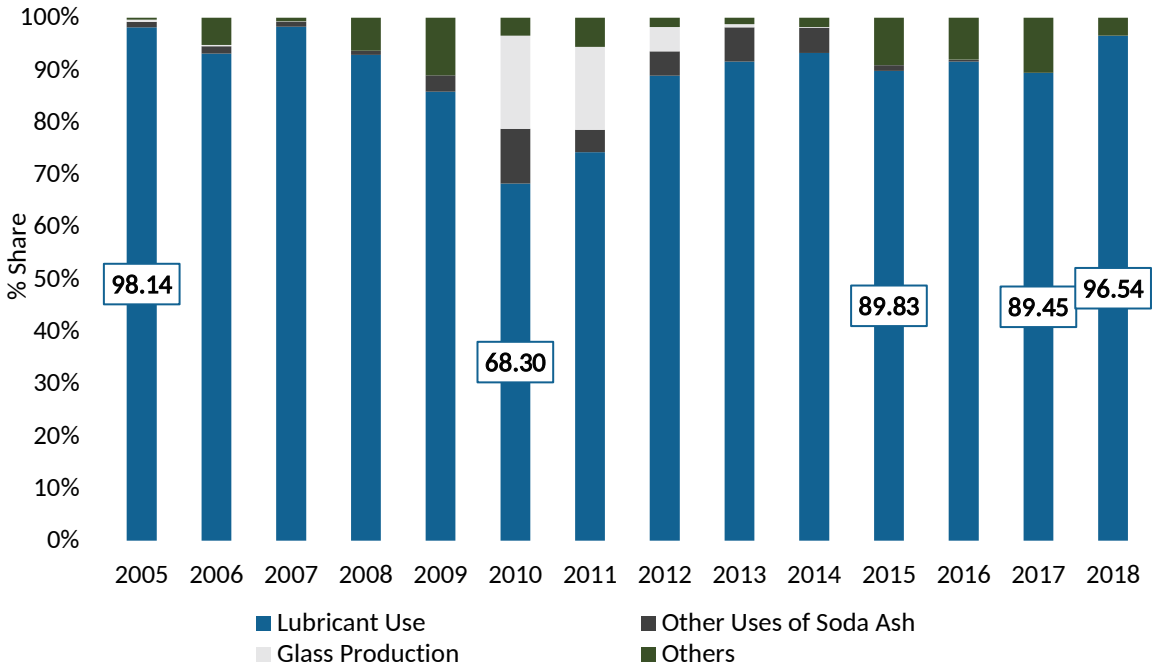


Figure 8: Category-wise Percentage Share of GHG Emissions from IPPU Categories (2005 to 2018)

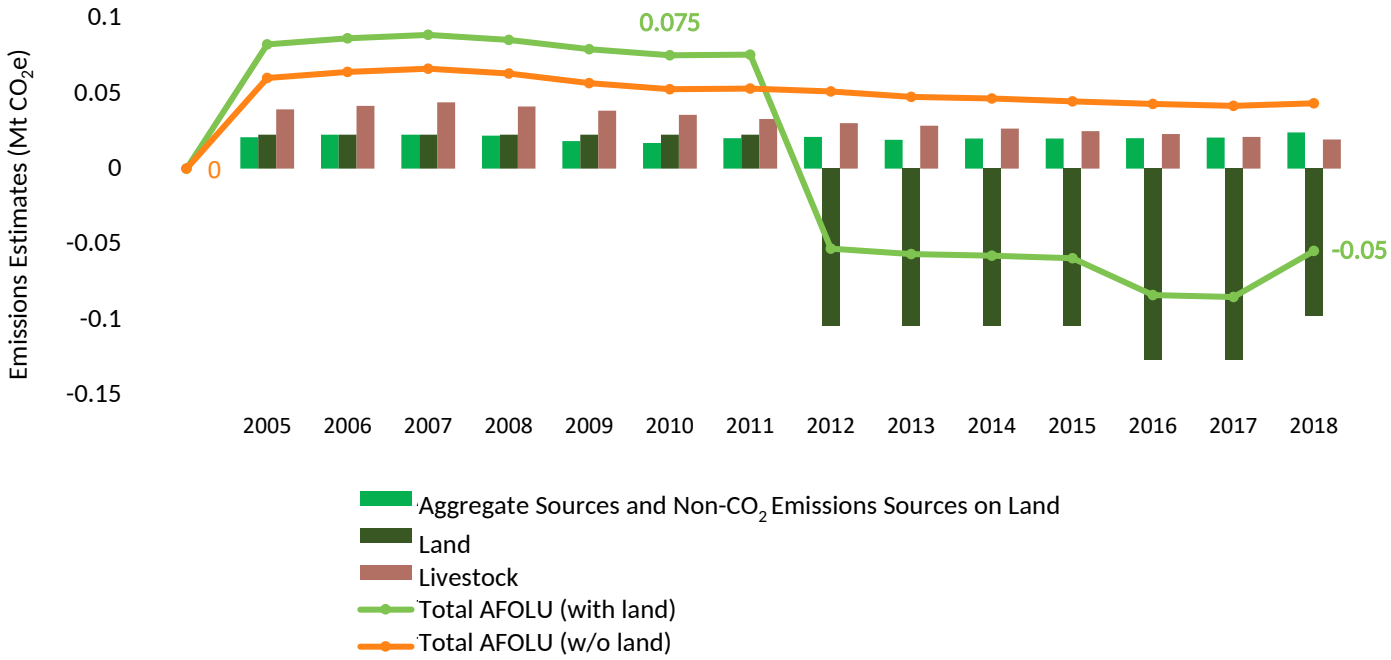


AFOLU Sector

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_2 Emissions Sources on Land*. In Dadra and Nagar Haveli, while the Livestock and Aggregate Sources and Non-CO_2 Emissions Sources on Land sub-sectors were net GHG emitters, the Land sub-sector was a sink from 2012 to 2018.

The AFOLU sector overall became a net sink of emissions from 2012 onwards. This was because removals from Agricultural Land increased significantly. Additionally, emissions from the highest contributing sub-sector, i.e., Livestock also declined at a CAGR of 5.30% over the reference period from 0.04 Mt CO_2e in 2005 to 0.02 Mt CO_2e in 2018 (see Figure 9). The average annual removals from the Land Sub-Sector in Dadra and Nagar Haveli during the reference period were 0.04 Mt CO_2e, around 83.35% of the average annual gross AFOLU emissions. Between 2012 and 2018 however, the removals from land on an average exceeded other AFOLU emissions by ~242%.

Figure 9: GHG Emissions Estimates of AFOLU Sector -Dadra and Nagar Haveli (2005 to 2018)



In 2018, the key contributors to positive AFOLU emissions (excluding Land sub-sector) were Rice Cultivation (54%) and Enteric Fermentation (40%) (see Figure 10). However, during the entire reference period, the average contribution of the Livestock sub-sector was ~60% of positive AFOLU emissions (see Figure 11).

Within the Livestock sub-sector, Enteric Fermentation was the major contributor to positive AFOLU emissions, with an average share of ~54.43%, across the reference period. However, emissions from this category declined at a rate of 2.97% (compounded annually) from 0.03Mt CO_2e in 2005 to 0.01Mt CO_2e in 2018.

From the Aggregate Sources sub-sector, the category of Rice Cultivation was the top contributor to positive AFOLU emissions with an average share of ~36.48%, during the reference period (see Figure 11). Emissions from Rice Cultivation increased at CAGR of 4.19% during the reference period.

** The sub-sector called 'Aggregate Sources and Non-CO_2 Emissions Sources on Land' includes emissions from Rice Cultivation, Agriculture Soils, Biomass Burning in Cropland and Forestland.*

Figure 10: Category-wise Emissions (Mt CO_2e) and Percentage Share in Positive AFOLU Emissions (excluding Land sub-sector) (2018)

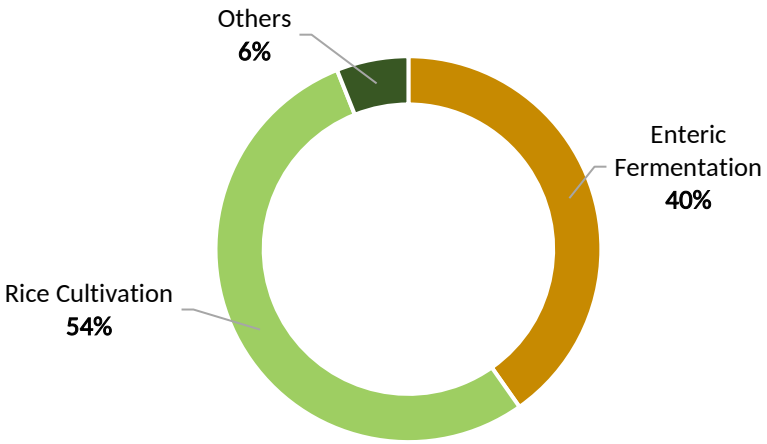
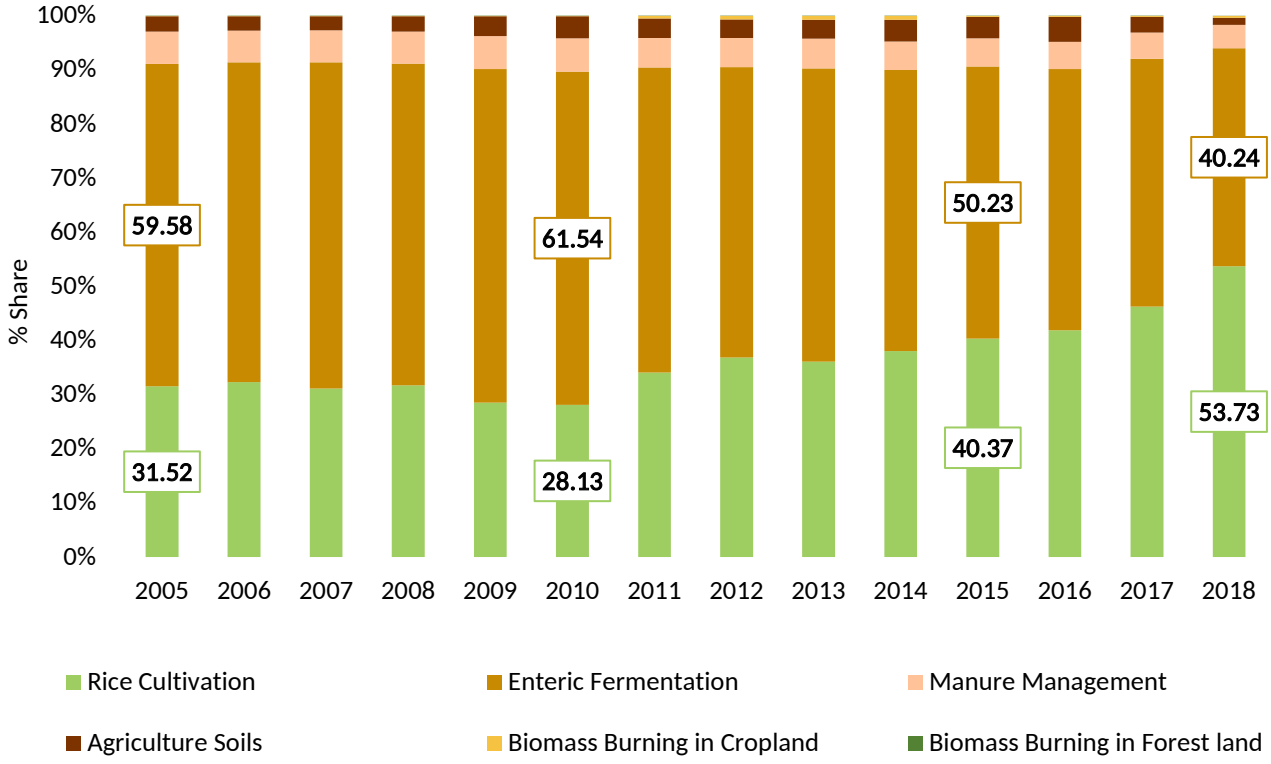


Figure 11: Category-wise Percentage Share in Positive AFOLU GHG Emissions (excluding Land sub-sector) (2005 to 2018)



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 almost 3% of the gross economy-wide emissions (excluding Land sub-sector within AFOLU) of Dadra and Nagar Haveli in 2018. GHG emissions from the Waste sector of Dadra and Nagar Haveli grew at a CAGR of 7.69% from 0.02 Mt CO_2e in 2005 to 0.04 Mt CO_2e in 2018. A significant rise in the overall Waste sector emissions was registered in 2011 owing to increased emissions from the Domestic Wastewater sub-sector.

Figure 12: GHG Emissions Estimates of Waste Sector- Dadra and Nagar Haveli (2005 to 2018)

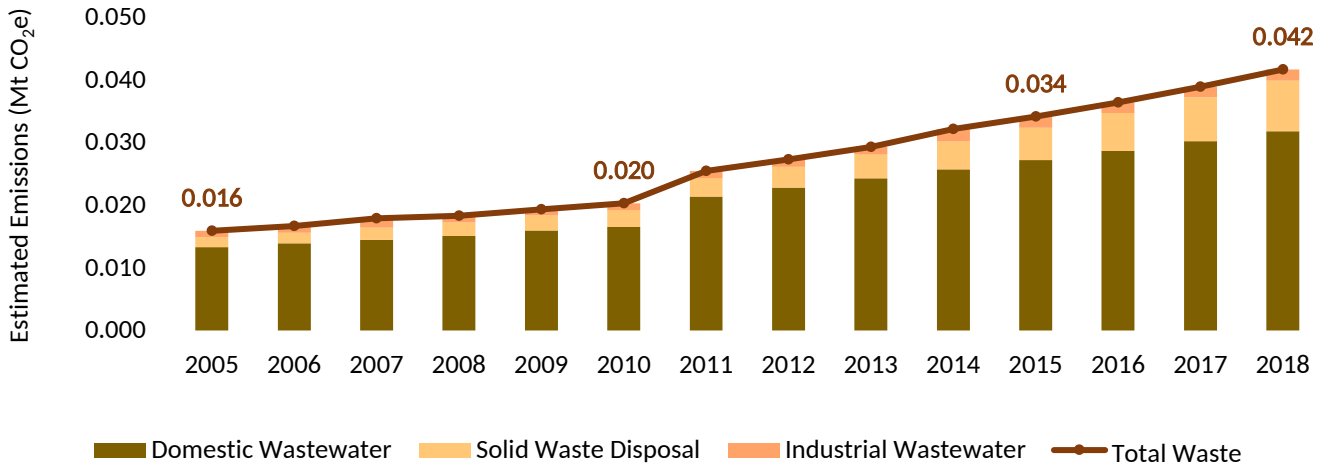
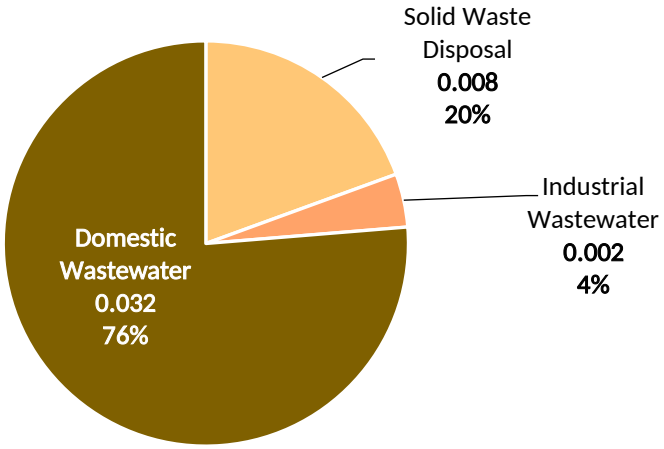


Figure 13: Sub-sector Emissions (Mt CO_2e) and Percentage Share in Total Waste Sector Emissions (2018)



Discharge of untreated wastewater and use of septic tanks are the key drivers of emissions due to Domestic Wastewater sub-sector. Domestic Wastewater had a share of 76% in the total Waste sector emissions of Dadra and Nagar Haveli in 2018. Approximately 20% of the Waste sector emissions were from Solid Waste Disposal, which grew at an estimated CAGR of 13.16% from 0.002 Mt CO_2e in 2005 to 0.008 Mt CO_2e in 2018. Industrial Wastewater accounted for nearly 4% of the Waste sector emissions in 2018 and grew at a CAGR of 4.17% (0.001Mt CO_2e in 2005 to 0.002 Mt CO_2e in2018) (see Figure 14).

Emissions from Domestic Wastewater of both rural and urban areas grew at a CAGR of 6.92% from 0.013 Mt CO_2e in 2005 to 0.032 Mt CO_2e in 2018. Almost 62% of Domestic Wastewater emissions were from the urban areas of Dadra and Nagar Haveli in 2018 (see Figure 15).

Figure 14: Area-wise GHG Emissions Estimates of Domestic Wastewater (2005 to 2018)

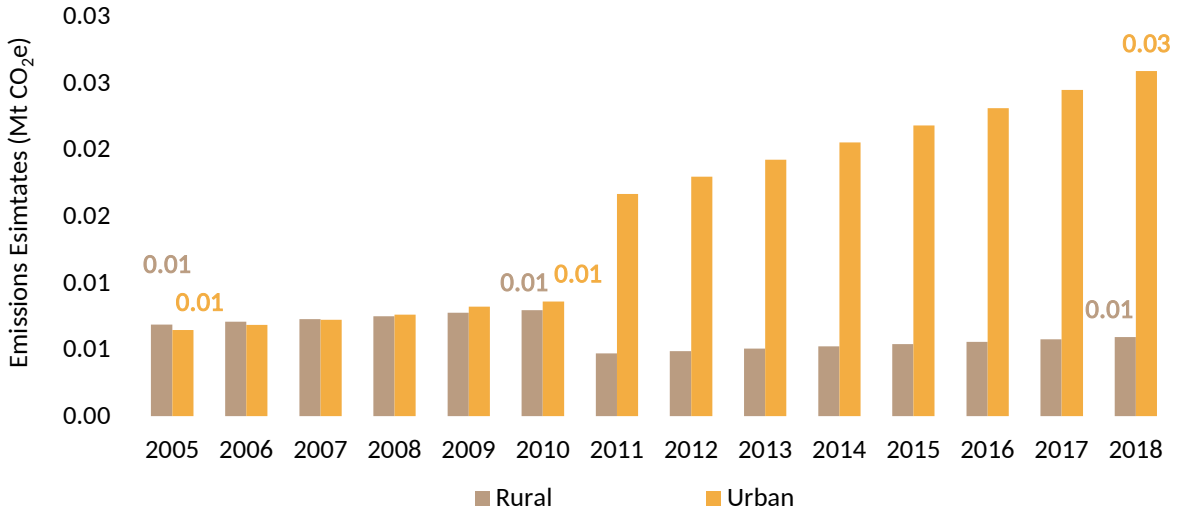
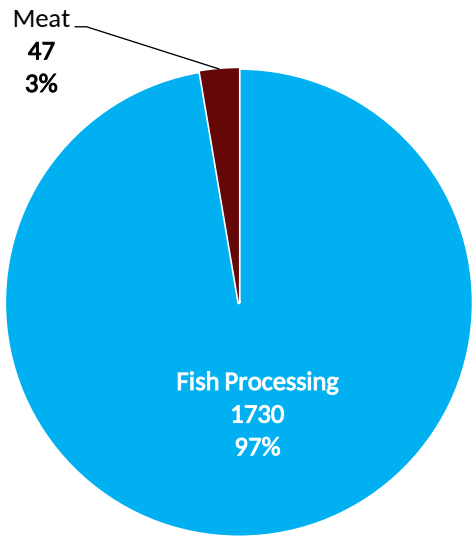


Figure 15 shows that the Fish Processing industry was the major contributor to the Industrial Wastewater emissions with a share of ~97% in 2018, this was followed by Meat Industry (3%).

Figure 15: Category-wise Emissions (t CO_2e*) and Percentage Share in Total Industrial Wastewater Emissions (2018)



*Please note that emissions of Industrial Wastewater categories given in Figure 12 are in tonnes of CO_2e and not in million tonnes (unlike all other graphs) because the total emissions values of these categories were very small

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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