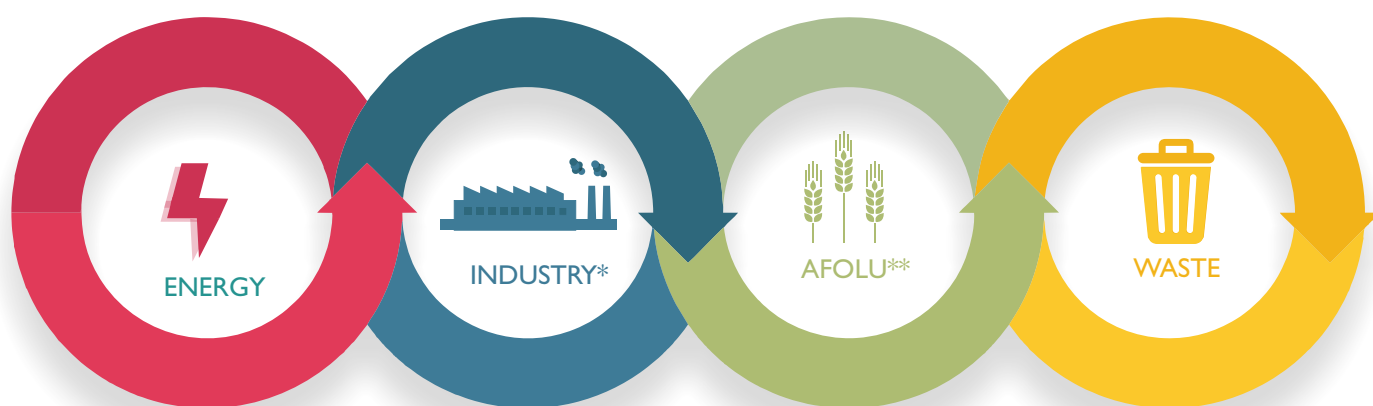


# Trend Analysis of GHG Emissions in India

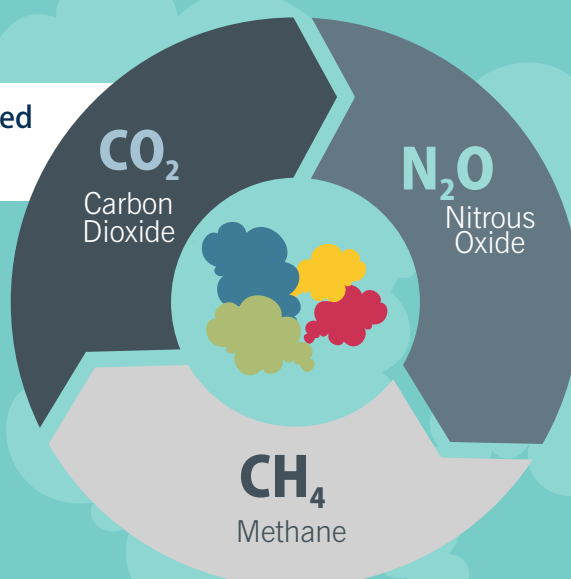


GHG Platform India is a collective civil society initiative providing an independent estimation and analysis of India's Greenhouse Gas (GHG) emissions across key sectors, namely, Energy, Industry\*, AFOLU\*\* and Waste. The platform seeks to add value to the various ongoing GHG estimation efforts by helping address existing data gaps and data accessibility issues, extending beyond the scope of national inventories, and by increasing the volume of analytics and policy dialogue on India's Greenhouse Gas emissions sources, profile, and related policies.

The Study Estimates and Assesses Greenhouse Gas Emissions and Removals from the following sectors:



The Greenhouse Gases Covered Under this Exercise are:

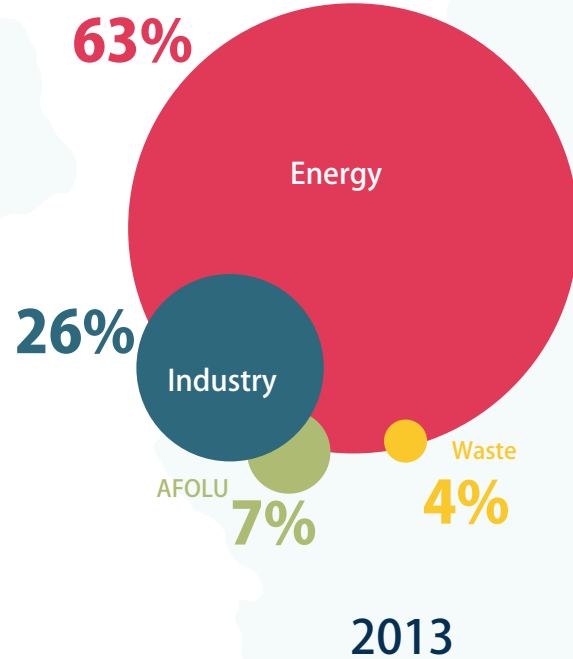
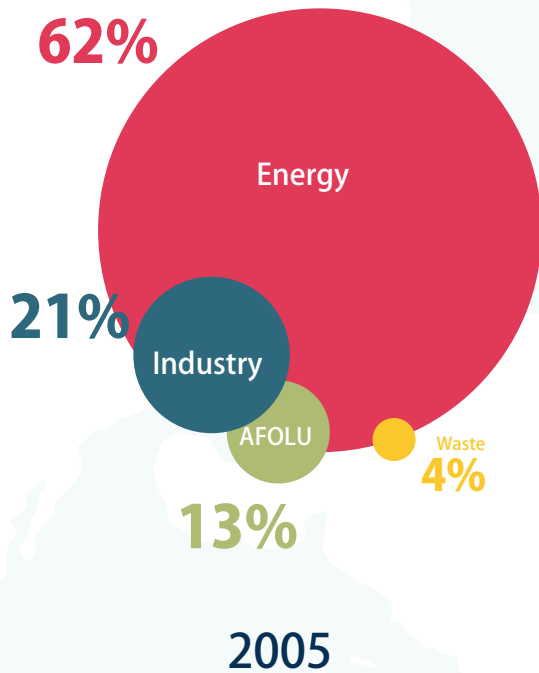


\* Industry emissions include Industrial Process and Product Use (IPPU) and Industrial Fuel Combustion (Fuel combusted for captive electricity generation has been reported under energy sector)

\*\* AFOLU - Agriculture, Forestry & Other Land Use

# Economy - Wide

## Sectoral Share of Emissions



### Sector-wise Emissions Growth Rate from 2005 to 2013

These growth rates have been compounded annually.

1.95%  
AFOLU

5.96%  
Energy

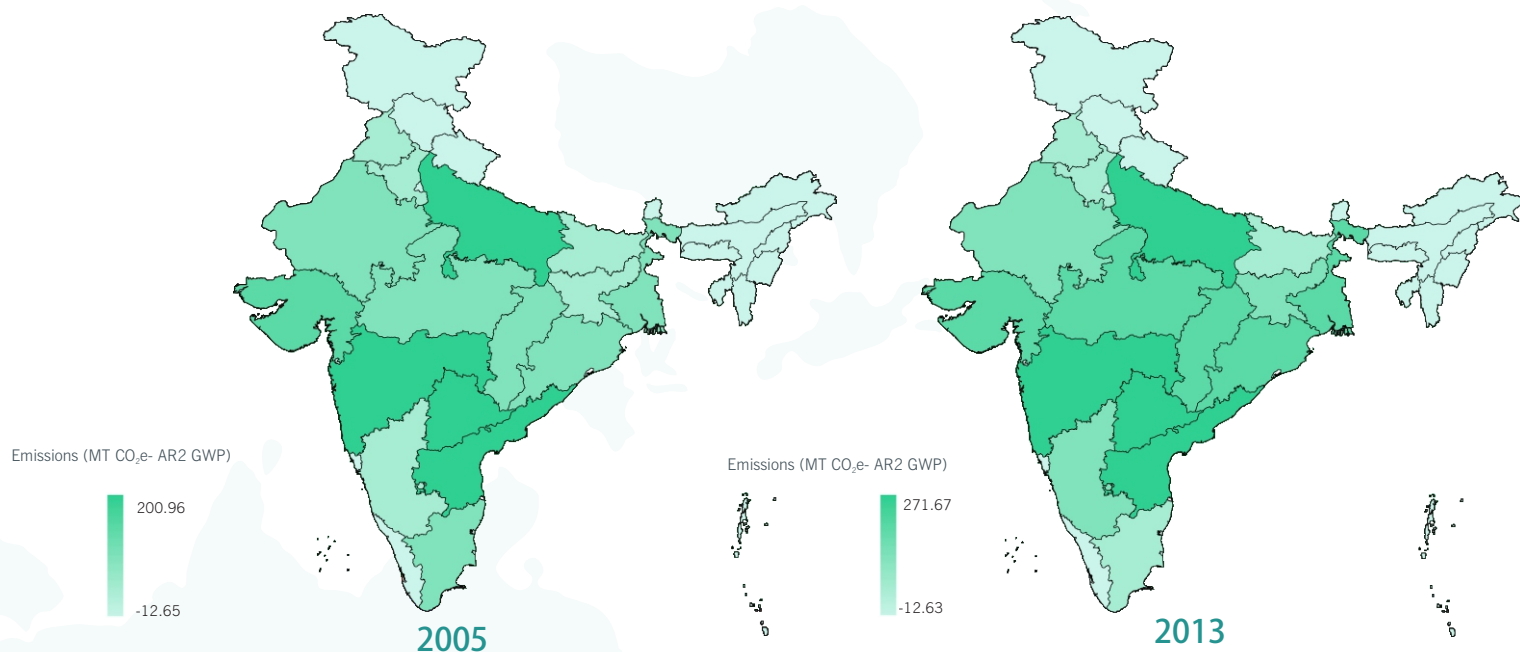
8.89%  
Industry

3.90%  
Waste

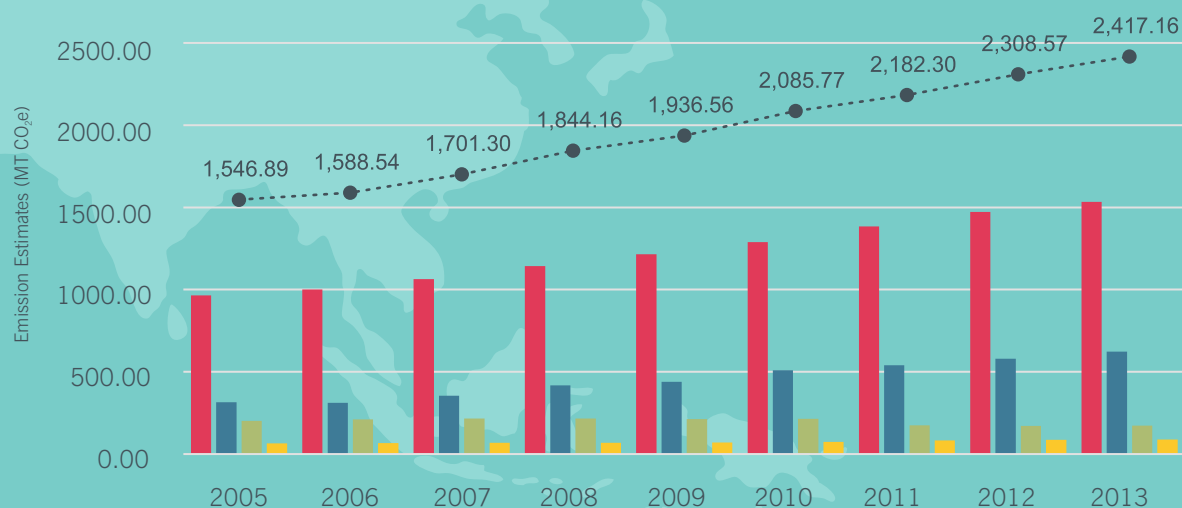
India's emissions have grown at the rate of  
**5.74%**  
(compounded annually)  
from 2005 to 2013

Energy Sector is the **Largest** contributor to GHG Emissions in India

# Emission Estimates



India's Total Emissions Profile  
from 2005 and 2013



Trend of Economy- wide GHG Emission Estimates  
from 2005 to 2013



# Energy

## Fuel Combustion:

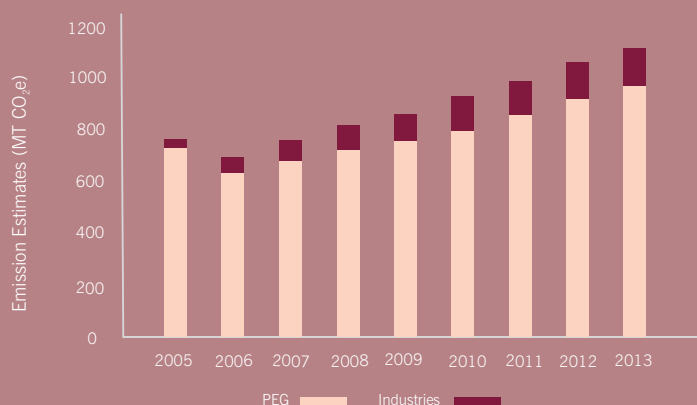
Electricity Generation  
Transport  
Residential  
Agriculture  
Commercial  
Fugitive Emissions

Electricity generation has been the single largest emitting category in India's emissions portfolio, accounting for 42% and 44% emissions in 2007 and 2010, respectively, as per official inventories.

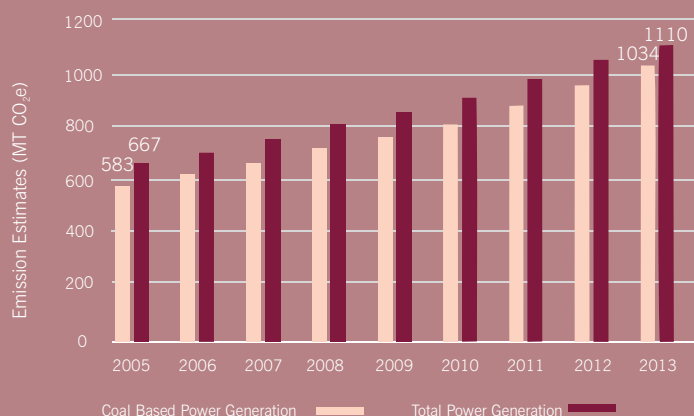
The installed capacity of the utility-based generators and Captive Power Plants (CPP) of 1 MW or above has grown at ~9% during the period from 2005 to 2013. The annual emission growth rates from utility and captive power plants were 6.2% and 9.1%, respectively.

There has been an increasing trend of emissions from coal and lignite based power plants. On the contrary, a decreasing trend of emissions was seen in the power plants using furnace oil, diesel, naphtha, gas and LSHS<sup>1</sup>/HHS<sup>2</sup>.

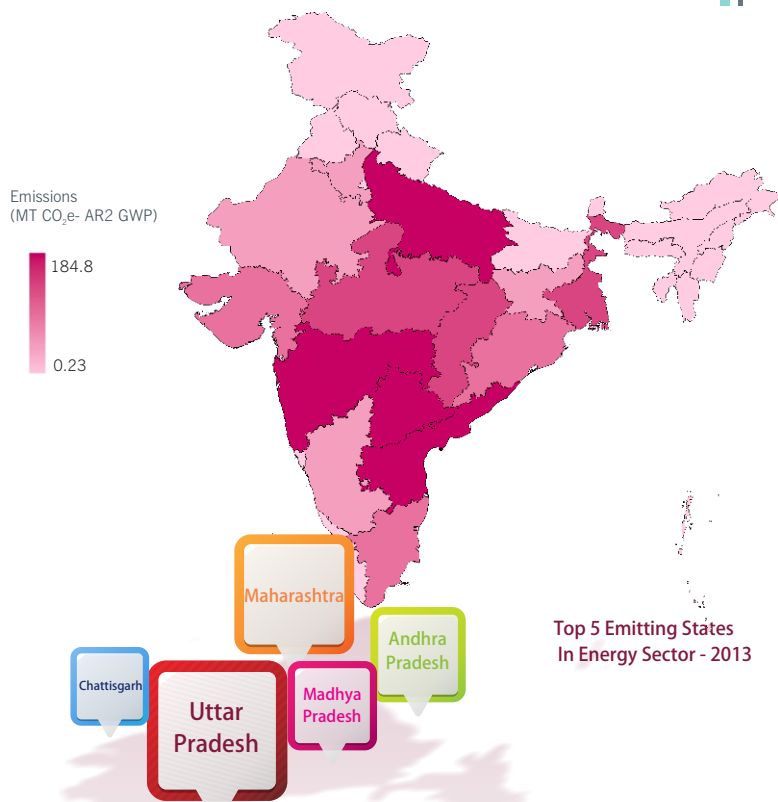
## Emissions from Electricity Generation (2005 to 2013)



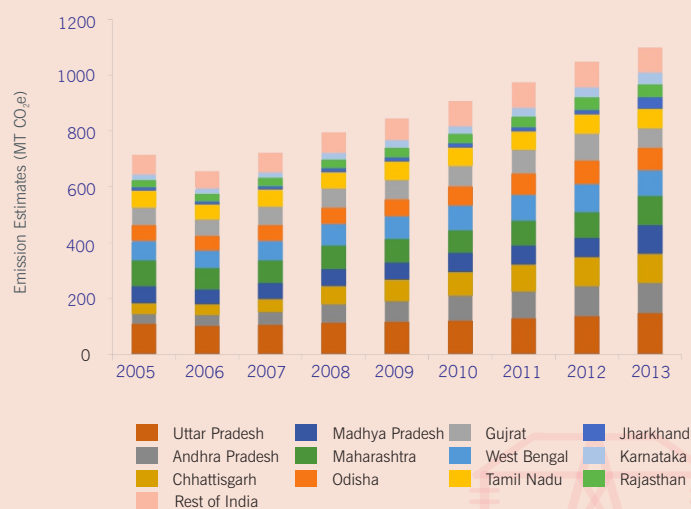
## Share of Emissions from Coal Based Power Generation (2005 to 2013)



## State-wise Total Energy Emissions Profile of India in 2013



## Statewise Emissions from Electricity Generation (2005 to 2013)



The top emitters in public electricity generation sector are Uttar Pradesh, Andhra Pradesh and Madhya Pradesh while that in captive electricity generation sectors are Odisha, Gujarat and Chhattisgarh.

<sup>1</sup>Low Sulphur Heavy Stock

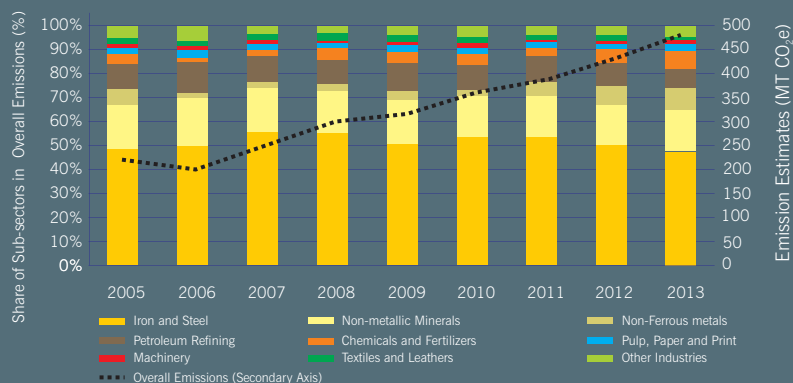
<sup>2</sup>Hot Heavy Stock

# Industry

Industrial Energy Use<sup>3</sup>  
Industrial Process and Product Use (IPPU)

Industry sector represents ~25% of the overall national estimates for the greenhouse gas emissions. As per our estimates, GHG emissions from industries grew at a compound rate of 9% – rising from ~315 Million Tonnes (MT) of Carbon-dioxide equivalent (CO<sub>2</sub>e) in 2005, to ~623 MT CO<sub>2</sub>e in 2013.

## Trend of Greenhouse Gas Emissions by Various Industrial Sub-sectors



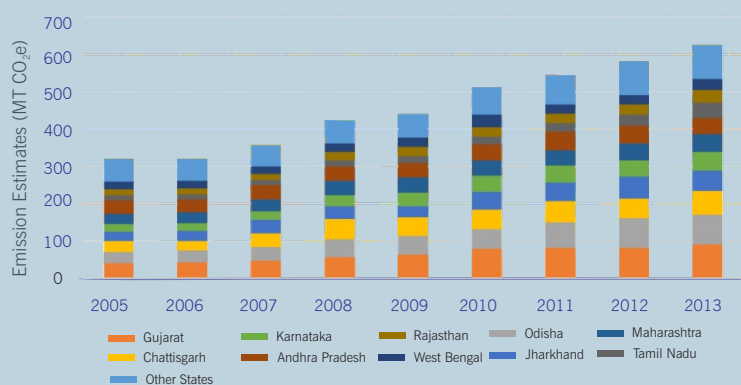
In 2013, manufacturing of iron and steel represented the largest share of emissions (38%), followed by non-metallic minerals (predominantly, cement) with a share of 29% in overall industrial emissions.

Coal consumption is the prime driver behind their overall emissions.



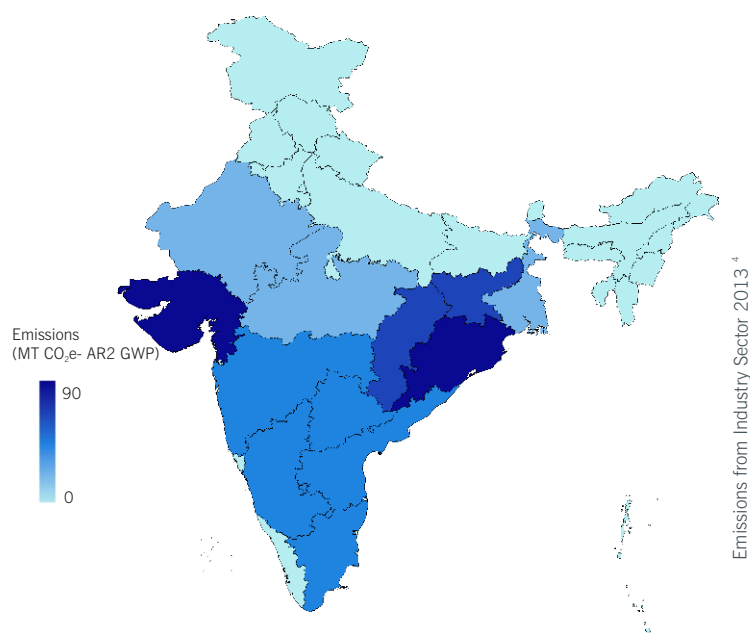
GHG emission due to industry energy use has grown upwards at a rate of 10%, rising from ~217 MT in 2005, to ~ 467 MT in 2013. Also, its share in the total industrial emissions has increased from 65% to 76% in the same period. IPPU emissions grew at a lower annual growth rate of 6% increasing from ~ 102 MT in 2005, to ~156 MT in 2013.

## State-wise GHG Emission Trend from the Industry Sector (2005 to 2013)



In 2013, out of 34 states and union territories considered for this evaluation, 10 states accounted for ~80% of GHG emissions from industry sub-sectors, viz. - Gujarat (14%), Odisha (13%), Chhattisgarh (10%), Jharkhand (9%), Karnataka (8%), Maharashtra (8%), Andhra Pradesh (7%), Tamil Nadu (6%), Rajasthan (5%), and West-Bengal (5%).

## State-wise Total Industrial Emissions Profile of India in 2013



<sup>3</sup> Fuel combusted for captive electricity generation has been reported under energy sector

<sup>4</sup> Emissions for Mizoram and Lakshwadeep have not been calculated for industry sector

# AFOLU

Livestock  
Land

Aggregate Sources & Non- CO<sub>2</sub>  
Emission Sources on Land

In 2013 AFOLU sector contributed to ~7% of India's overall GHG emissions. The emissions decreased from ~201 MT CO<sub>2</sub>e in 2005 to ~172 MT CO<sub>2</sub>e in 2013. This marginal decline is primarily due to increased removal of CO<sub>2</sub> by land, mainly forests which acts as a carbon sink.

9%  
Livestock

Percentage contribution to the economy in 2013

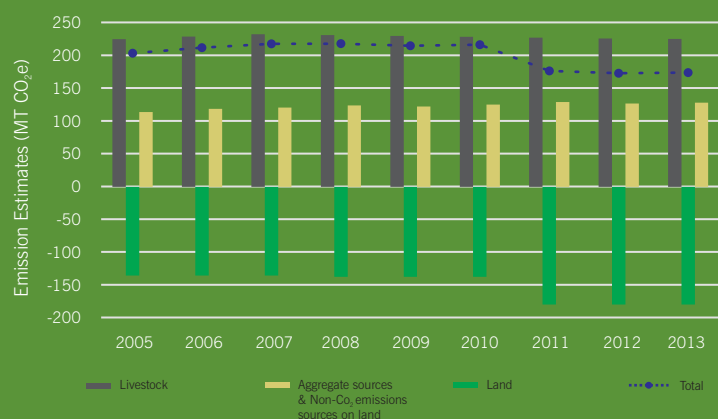
7%  
Land  
(Sink)

5%  
Aggregate  
Sources<sup>4</sup>

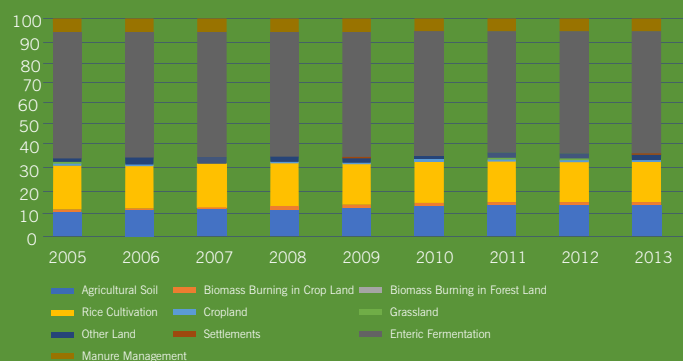
Emissions from this sector are dominated by mainly two sources viz. livestock and rice cultivation which together account for ~ 80% of the emissions.

Apart from these two sub-categories another sub-category with significant emissions is Direct and Indirect N<sub>2</sub>O emissions agriculture soils that show an increasing trend primarily due to use of fertilisers.

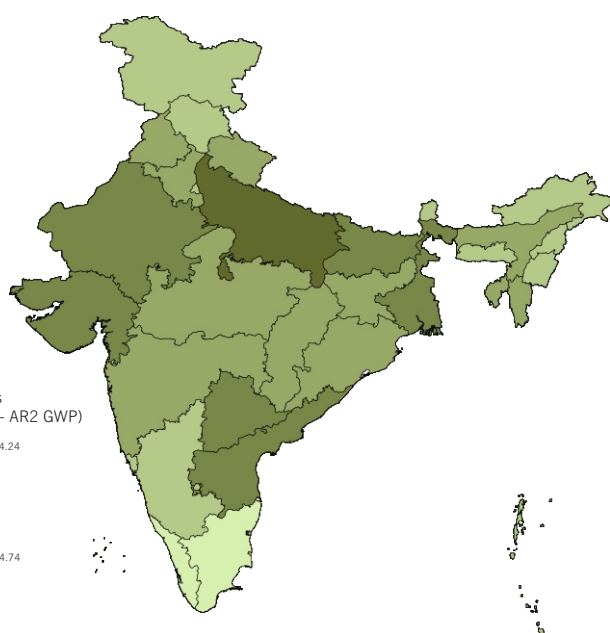
## Total Emissions from AFOLU Sector from 2005 to 2013



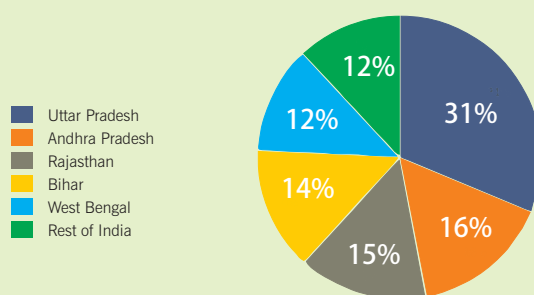
## Share from AFOLU Sector without Forest Land (2005-2013)



## State-wise Total AFOLU Emissions Profile of India in 2013



## Share of Emissions from Top Five States in India - 2013



States with maximum emissions from AFOLU sector in 2013 were Uttar Pradesh, Andhra Pradesh, Rajasthan, Bihar and West Bengal. These states together accounted for ~88% of India's total AFOLU emissions.

There are, however, many states that have negative emissions from this sector, primarily because of a large forest area within their territories. The top 5 states/UT with negative emissions in 2013 were Kerala, Tamil Nadu, Arunachal Pradesh, Jammu & Kashmir, and Andaman & Nicobar Islands.

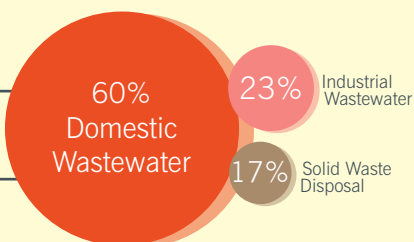




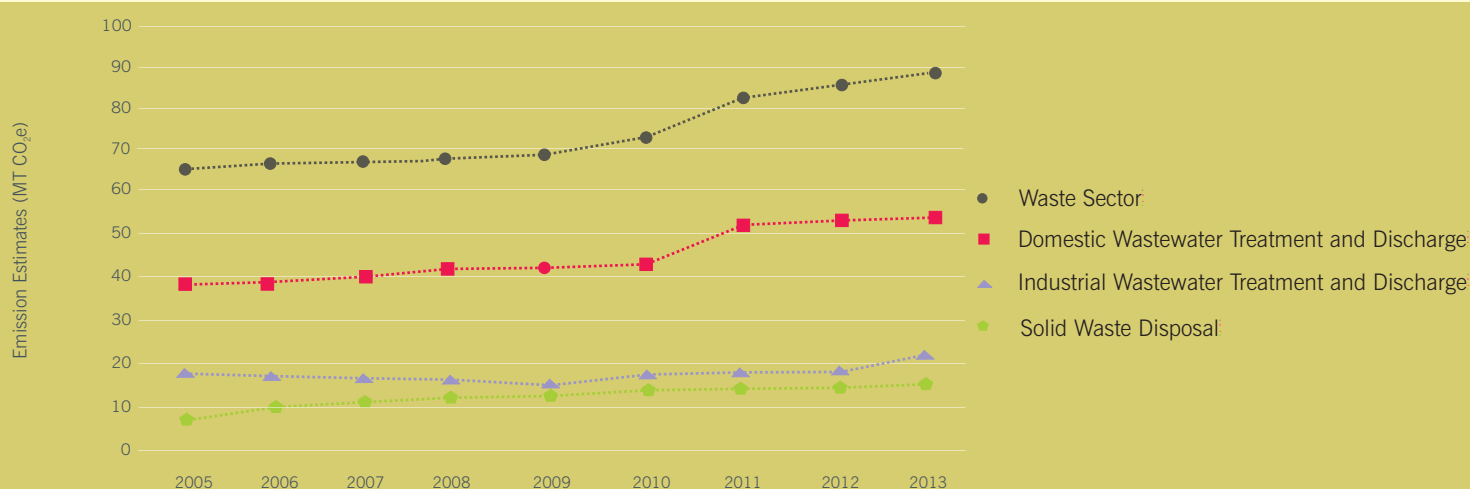
# Waste

Solid Waste Disposal  
Domestic Wastewater  
Industrial Wastewater

Sub-sector Contribution to the Waste Sector in 2013



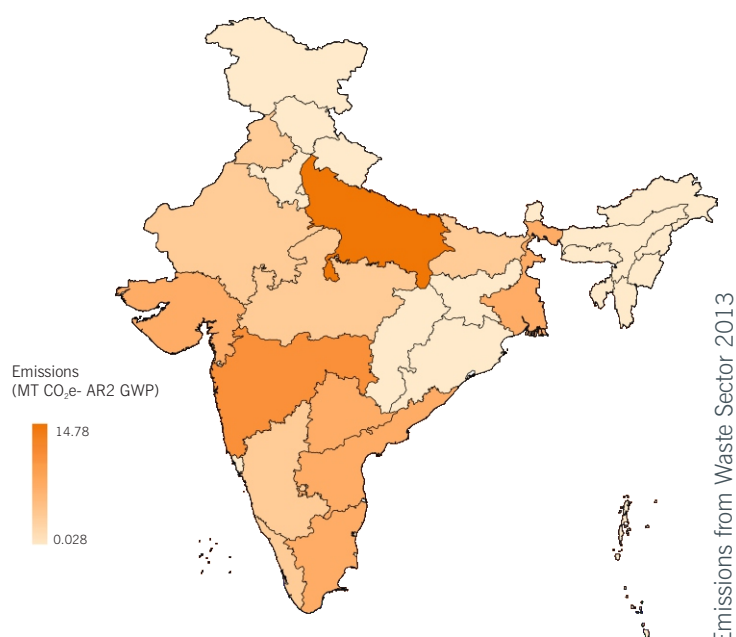
## GHG Emission Estimates for Waste Sector in India from 2005 to 2013



The six states of Uttar Pradesh, Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu and West Bengal together contributed to 57% of the Waste Sector emissions in the 2013.

Changing solid waste composition across the states has resulted in an increase in the GHG emission generated from every tonne of solid waste disposed over the years. Rural areas and urban areas contribute to about 60% and 40% of the total emissions from domestic wastewater in the country respectively. Pulp & paper, Coffee, Soft drink, Meat and Tannery sectors are critical industry sectors having the highest GHG emission per tonne of product and for every cubic meter of industrial wastewater generated.

## State-wise Waste Emissions profile of India from 2005 to 2013





# GHG Platform INDIA

The GHG Platform India is a collective civil society initiative providing an independent estimation and analysis of India's Greenhouse Gas (GHG) emissions across key sectors, namely, Energy, Industry, AFOLU and Waste.

The platform comprises civil society groups as under:



In collaboration with



**Council on Energy, Environment and Water (CEEW)** is one of South Asia's leading not for profit policy research institutions.

**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 association of more than 1000 metropolises, cities, urban regions and towns across the world.

**Shakti Sustainable Energy Foundation** works to strengthen the energy security of the country by aiding the design and implementation of policies that encourage energy efficiency, renewable energy and sustainable transport solutions.

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

**WRI- India** is a global research organization that spans more than 50 countries, with offices in the United States, China, India, Brazil, Indonesia and more.

All information mentioned in this document is sourced from GHG Platform India.  
To download this document and to know more about the Platform,  
please visit [www.ghgplatform-india.org](http://www.ghgplatform-india.org) or write to [info@ghgplatform-india.org](mailto:info@ghgplatform-india.org)

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