



Waste Sector Emissions Estimates for 2005-2013: National and State Level

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Venue: Magnolia Hall, India Habitat Centre, New Delhi



Key Trends –Waste Sector – National Estimates



❑ Contribution to Waste Sector emissions (2013)

- Domestic wastewater: **59.8 %**
- Industrial wastewater: **23.5 %**
- Solid waste disposal: **16.7 %**

❑ GHG emissions from Waste:

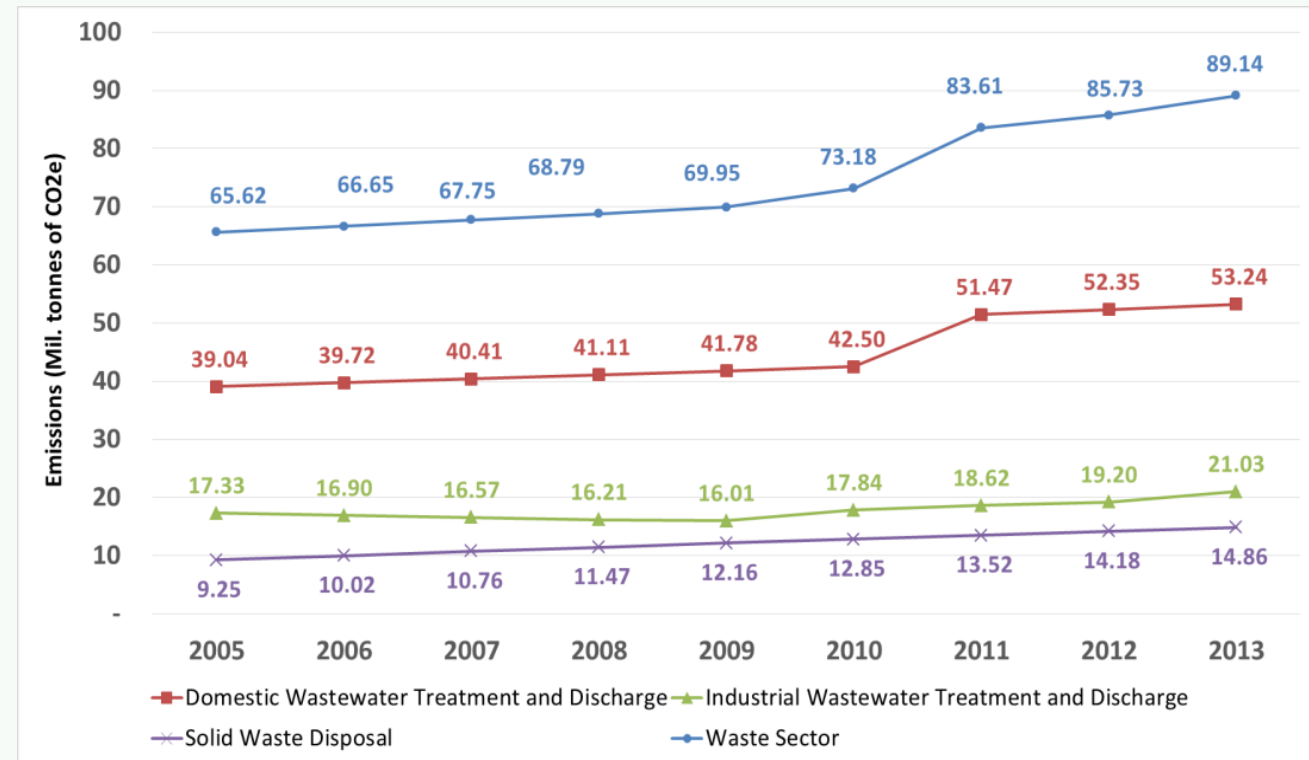
- 2005-2013: **36%** ↑
- CAGR: **3.9%** ↑

❑ Per capita emissions for Waste sector

- 2005: **0.060 tonnes of CO₂e**
- 2013: **0.071 tonnes of CO₂e**
- CAGR: **2.1%** ↑

❑ Emission intensity (i.e. GHG emission per unit GDP)

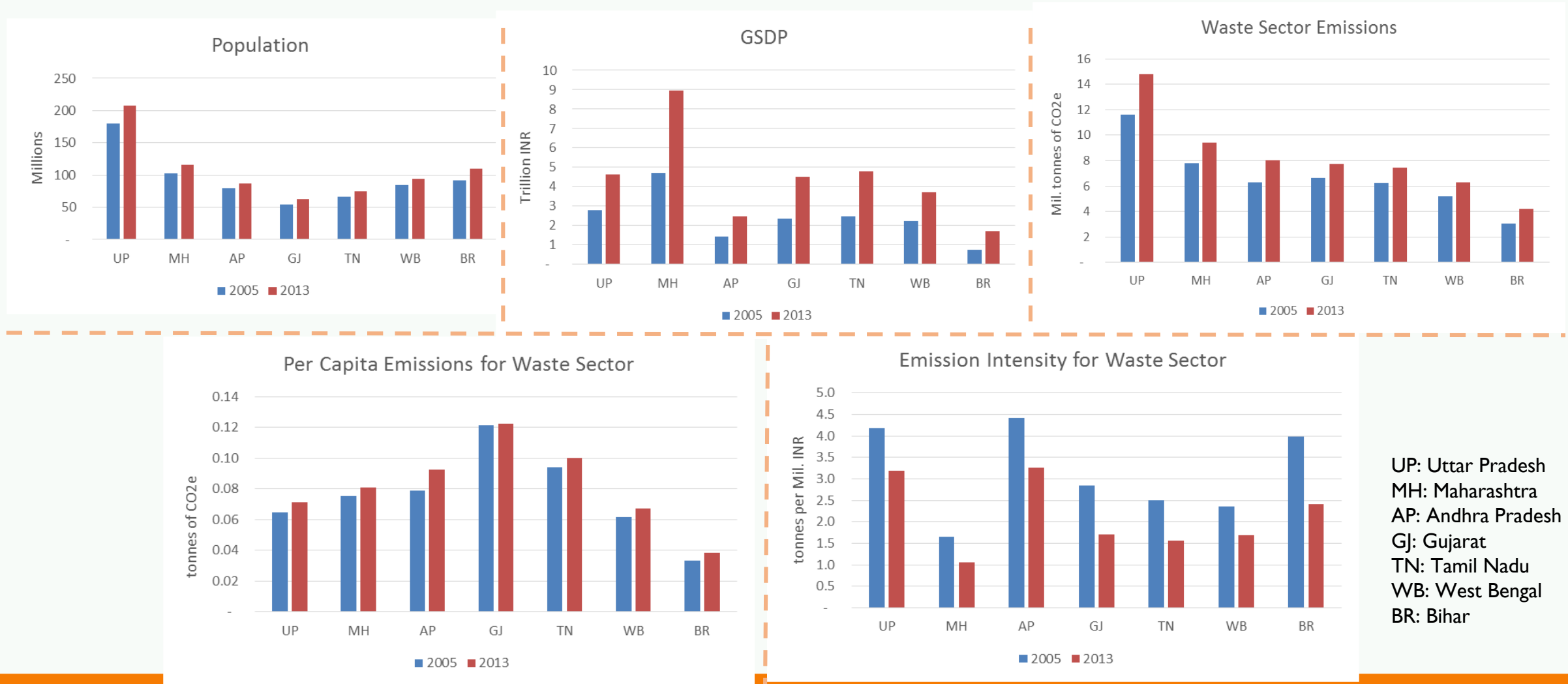
- 2005-2013: **23 %** ↓
- CAGR: **3.2 %** ↓



Key Trends – Waste Sector - State Estimates



□ Uttar Pradesh, Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu, West Bengal, Bihar : ~60% of the total Waste sector emissions in 2013

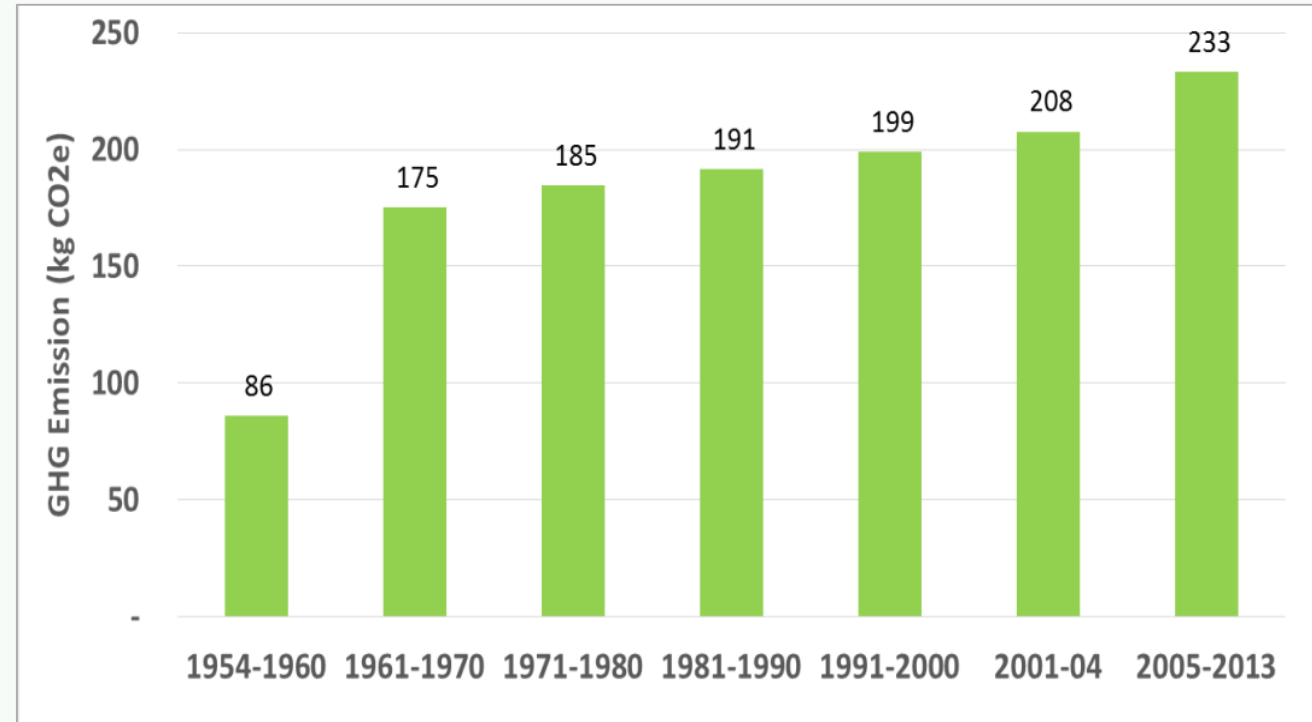


UP: Uttar Pradesh
 MH: Maharashtra
 AP: Andhra Pradesh
 GJ: Gujarat
 TN: Tamil Nadu
 WB: West Bengal
 BR: Bihar

Key Trends - Solid Waste Disposal – National Estimates



- ❑ CAGR (2005-2013): **6.1%** ↑
- ❑ Changing waste composition in Indian cities has impacted the emissions generated due to municipal solid waste disposal
- ❑ GHG emission for every tonne of MSW disposed **increased by 2.7 times** from that in 1954-1960



Waste management hierarchy based on emission generation -
Bio-methanation > Composting > landfill disposal > uncontrolled incineration

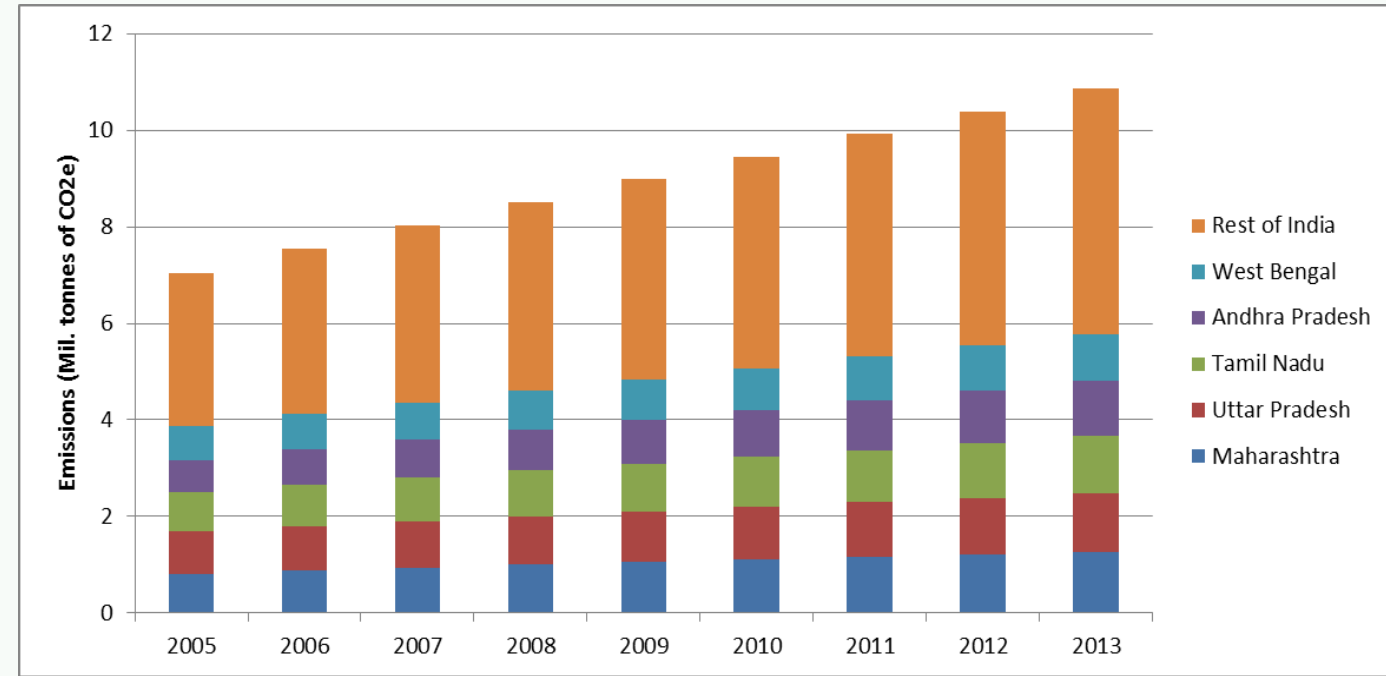
Key Trends - Solid Waste Disposal- State Estimates



☐ Maharashtra, Uttar Pradesh, Tamil Nadu, Andhra Pradesh and West Bengal : **53 %** of emissions in 2013

☐ GHG emission per tonne of waste disposed varies across the states due to varying composition

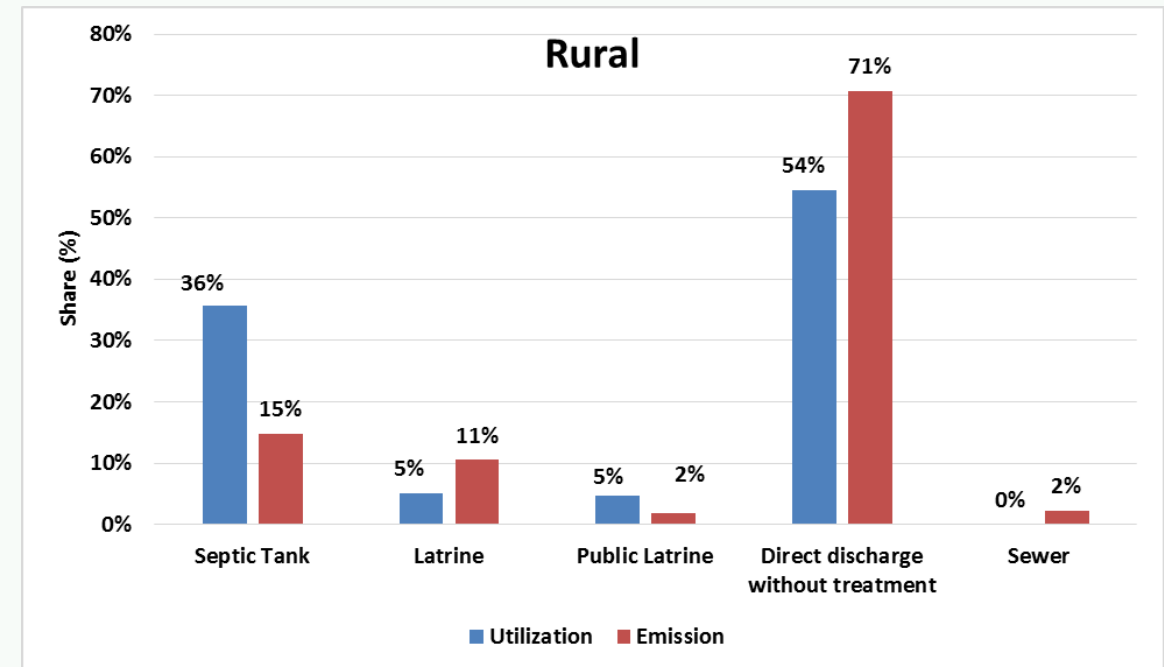
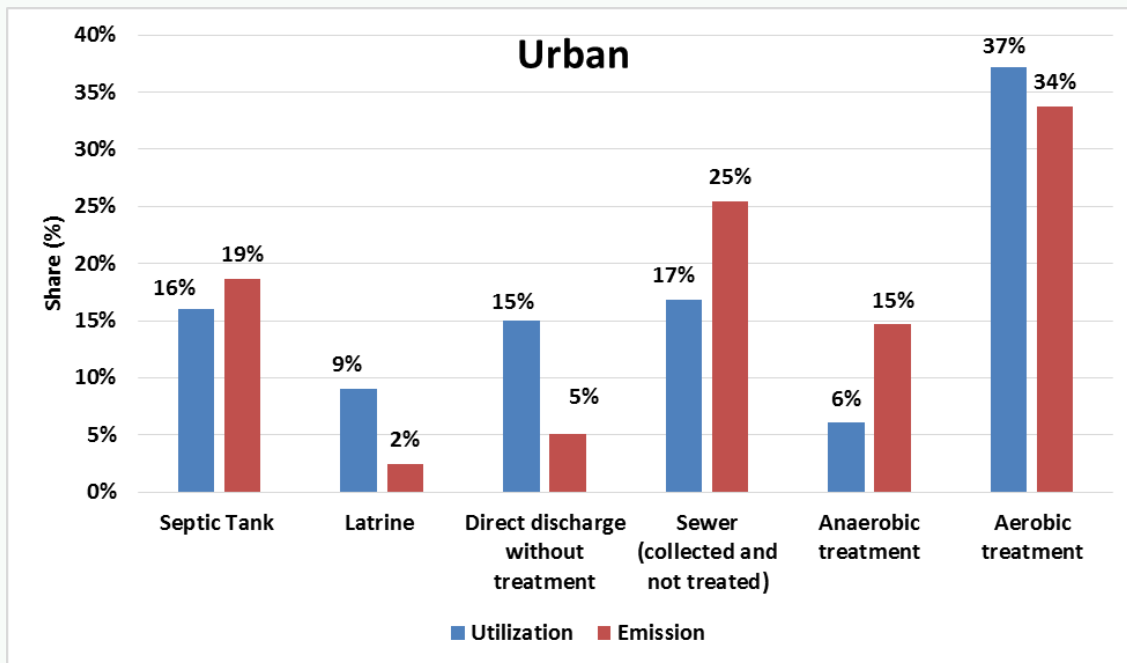
131 kg of CO₂e - 329 kg of CO₂e



Key Trends - Domestic wastewater treatment and discharge – National Estimates



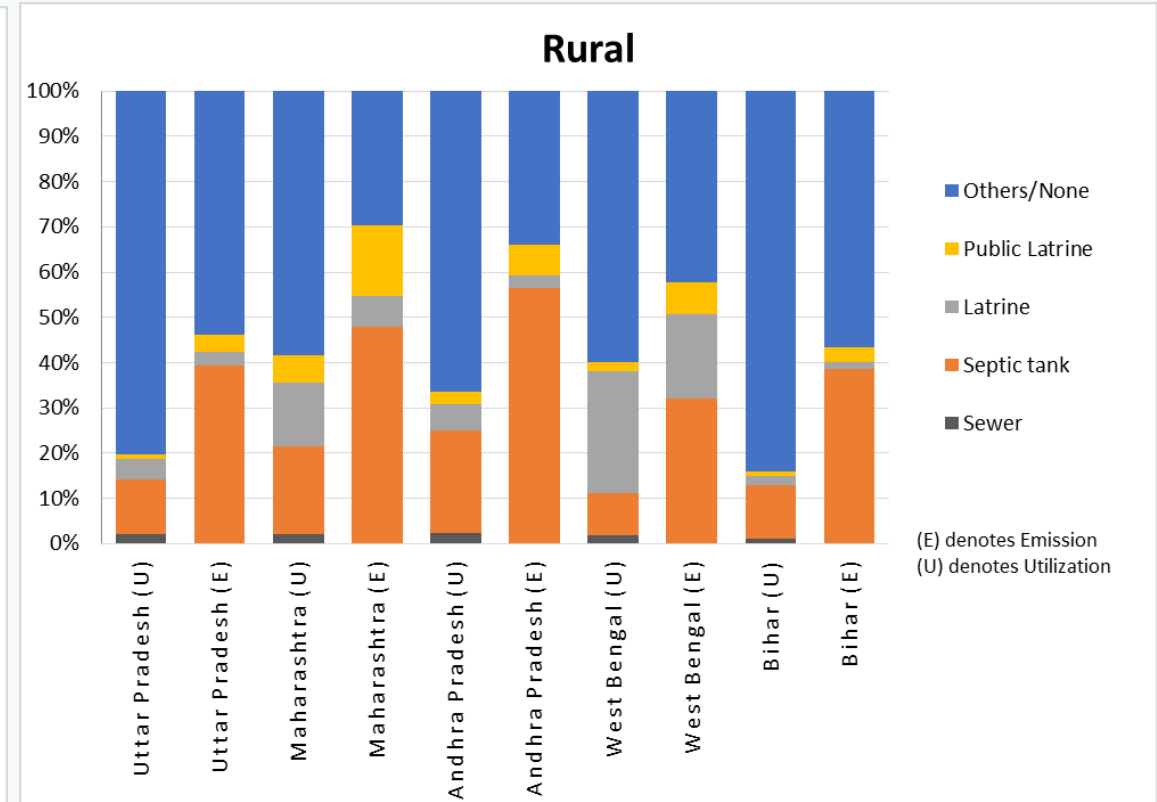
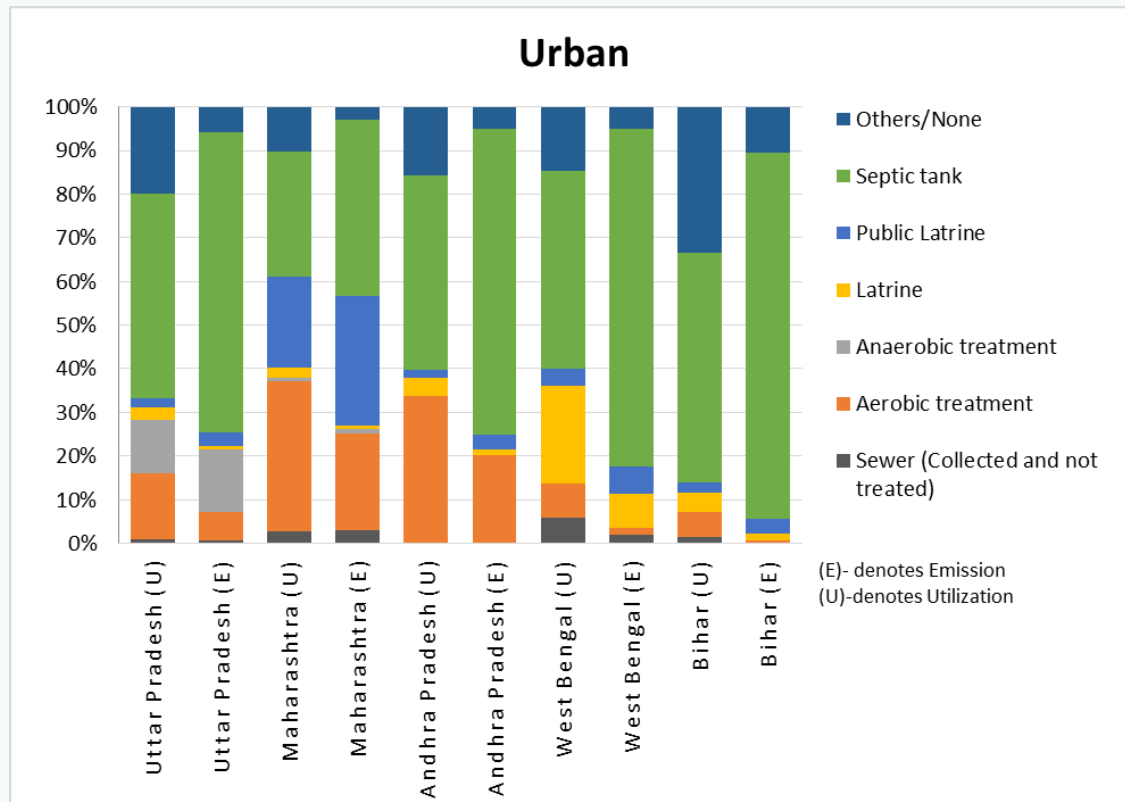
- ❑ CAGR (2005-2013): **4.0 %** ↑
- ❑ Wastewater treatment type and conveyance impact emissions
- ❑ Per capita GHG emissions from domestic wastewater
 - Urban: **36.4 kg of CO₂e**
 - Rural: **24.2 kg of CO₂e**



Key Trends - Domestic wastewater treatment and discharge – State Estimates



- ❑ Uttar Pradesh, Maharashtra, Andhra Pradesh, West Bengal and Bihar: ~50% of emissions in 2013
- ❑ Utilization and emissions from septic tank systems considerable
- ❑ Minimizing untreated discharge of wastewater and improved management of sewage treatment plants important

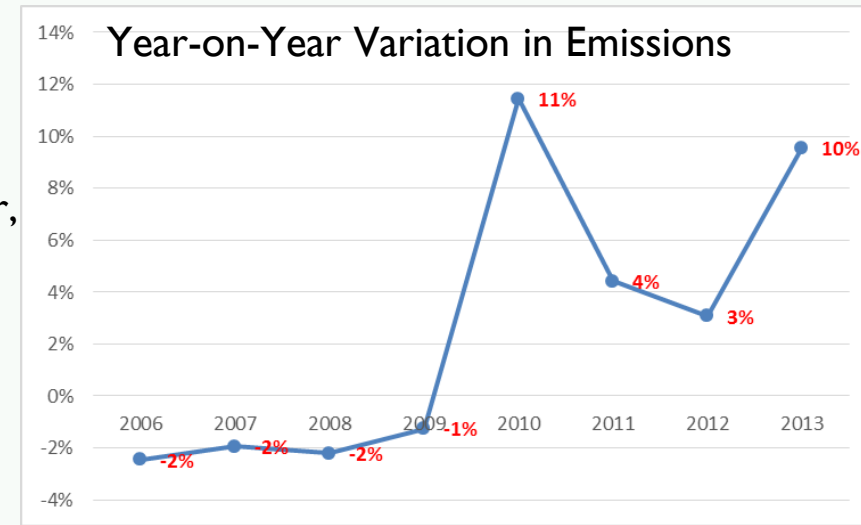


Source: 1) ICLEI SA analysis based on GHG platform India-2005-2013 State Estimates – 2017 Series

2) Data on utilization based on Census 2001 and 2011 household survey dataset on the 'availability of different types of latrine facilities and from CPCB publications on STP evaluation in 2007, 2009-10 and 2013

Key Trends - Industrial wastewater treatment and discharge – National Estimates

- ❑ 12 sectors considered- Fertilizers, Meat, Sugar, Coffee, Pulp and Paper, Petroleum, Beer, Soft Drinks, Rubber, Dairy and Tannery, Iron and Steel
- ❑ CAGR: 2.5 % ↑
- ❑ Pulp & paper, Coffee, Soft drink, Meat and Tannery sectors are critical sectors



Industry Sector	GHG emission per tonne of product (kg of CO ₂ e)	GHG emission per m ³ of wastewater generated (kg of CO ₂ e)
Coffee	189.0	37.8
Soft drink	139.9	37.8
Pulp & Paper	1,749.5	24.8
Meat	201.5	17.2
Tannery	104.2	3.3
Fertilizers	25.2	3.1
Sugar	3.1	3.1
Beer	27.4	3.0
Dairy	7.1	2.4

Notable year-on-year variation in national-level Industrial wastewater emission estimates

Note: In the assessment, the condition of the prevalent aerobic type wastewater treatment systems for Iron & Steel, Petroleum and Rubber industries is assumed to be well managed, and thereby these systems have Methane Correction Factor value of zero and thereby an emission factor value of zero (based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories), thereby leading to no CH₄ emissions from wastewater treatment. Thus, the Iron & Steel, Petroleum and Rubber sectors are not included in the Table

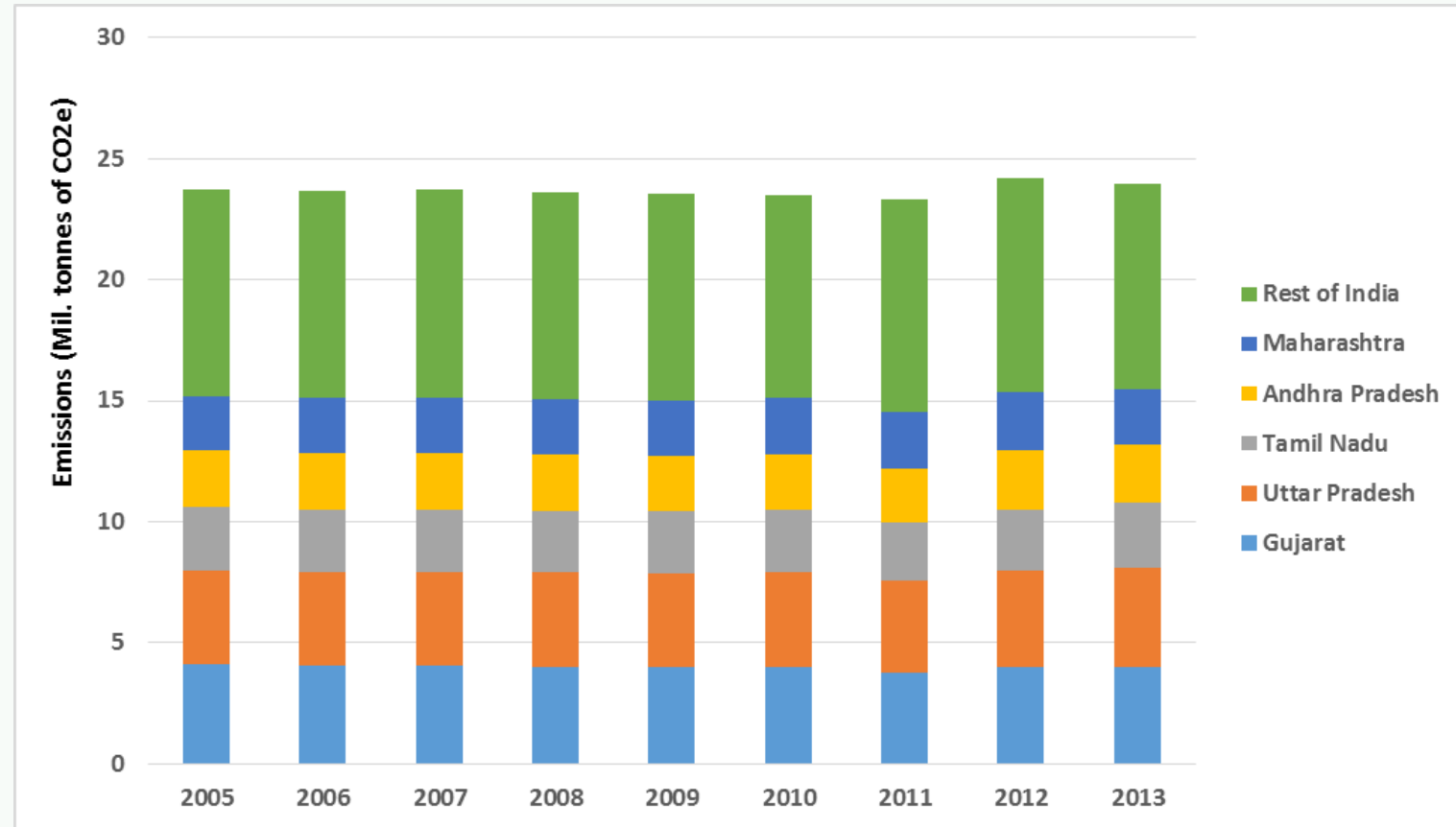
Key Trends - Industrial wastewater treatment and discharge – State Estimates



- Gujarat, Uttar Pradesh, Andhra Pradesh, Tamil Nadu, and Maharashtra :

70 % of emissions in 2013

- Higher industrial activity driving emissions in these states, particularly in Pulp and paper, Meat and Dairy sectors



Challenges

<p>Limited access to background/detailed documents of National Communications</p>	<ul style="list-style-type: none"> • Activity data and data sources • Underlying assumptions • Emission factors & sector specific parameters/coefficients
<p>Limited updated information in secondary sources on values for country specific parameters</p>	<ul style="list-style-type: none"> • Coefficients for organic characteristics of solid waste and wastewater • Emission factors for treatment technologies in use on-ground • Degree of utilization rates for domestic wastewater discharge/treatment
<p>Limited availability of updated year-wise activity data and reliability issues</p>	<ul style="list-style-type: none"> • Solid waste composition and per capita waste generation rates at state and city level • Regularly updated information on use of different wastewater discharge/treatment systems in rural and urban households • Wastewater generation and prevalent treatment technologies & their mix for industry sectors generating organic wastewater • Industrial production data for all relevant sectors and across all states (e.g. Beer and Soft drinks sectors is not available at state level) • Inconsistencies in official datasets/statistical records – national and state-level
<p>Usability of reported data for accurate emission estimation</p>	<ul style="list-style-type: none"> • Limitations in datasets with regards to usability of activity data - <ul style="list-style-type: none"> - Industrial output data in datasets such as ASI is not available in a metric (i.e. tonnes) that would help in computing accurate emissions -Operational status of solid waste processing/treatment facilities

Recommendations



❑ Need for **periodic reporting** on

- Changes in solid waste composition and generation rates, status of operational and non-operational solid waste processing plants
- Treatment technologies, performance (underutilization/overutilization) of sewage treatment plants by Central and State Pollution Control Boards
- Status and impacts of on-ground developments and improvements in wastewater discharge/treatment systems

❑ **Use existing data management processes** to capture information required and identify relevant entities

- E.g. Annual reports from States on solid waste management collected by State Pollution Control Boards and under Swachh Bharat Mission
- Industrial information collected under the Annual Survey of Industries (ASI) - promote reporting in metrics that better conform to accurate GHG emission estimation

e.g. reporting beverage production in 'kilolitres' instead of 'nos. of bottles'

reporting fertilizer production in 'tonnes' instead of 'no. of bags'

- Data on volume of wastewater generated, its physio-chemical characteristics such as COD, and treatment processes collected by SPCBs from registered industries



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