

# India's GHG inventories at regional and city level: Achievements, gaps and necessary support required

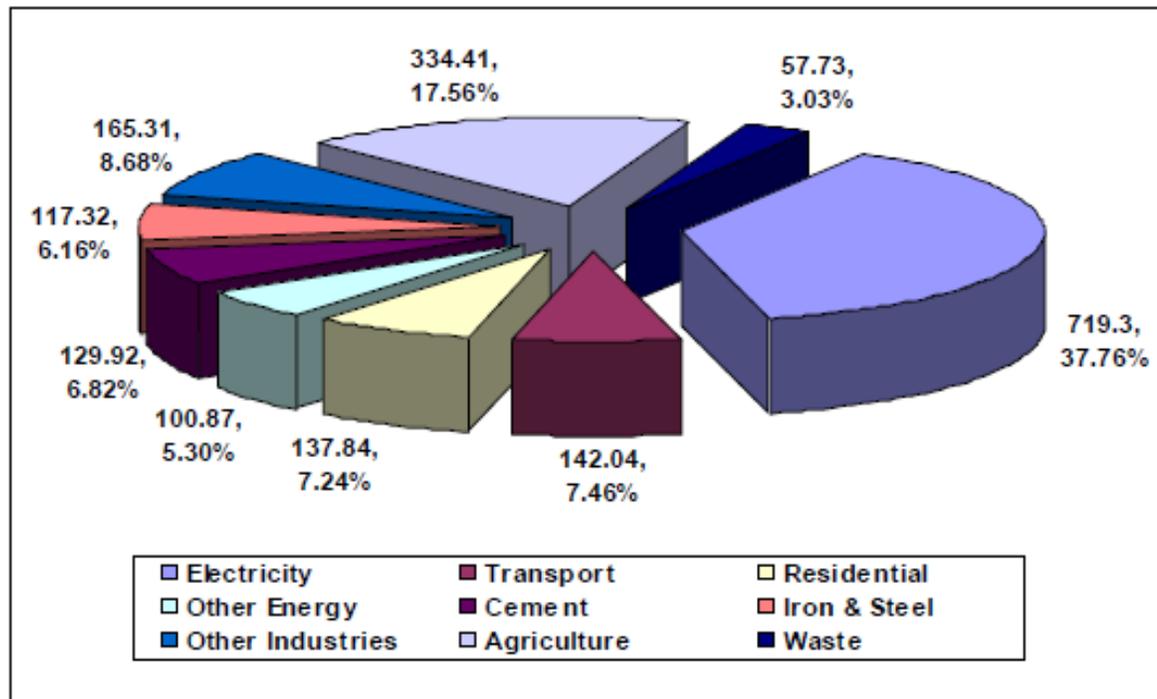
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# India's National GHG emission Profile & its Voluntary commitment

- ▶ Total GHG emissions in 2007: 1727.70 million tons CO<sub>2</sub> eq and with LULUCF 1904.73 million tons of CO<sub>2</sub> eq
- ▶ Quantified through the NATCOM in coordination with institutions within the Indian Network for Climate Change Adaptation (INCCA)
- ▶ India will voluntarily cut its emissions intensity by 20 to 25 percent with respect to 2005 level by 2020
- ▶ Sectoral GHG emission distribution:



# Mitigation Pathways ascertained

- ▶ Residential sector
  - ▶ efficient energy Building codes and
  - ▶ efficient appliances
- ▶ Industry
  - ▶ Target - Large industries for energy efficiency
- ▶ Transport
  - ▶ Smart mobility systems and biofuel blends, electric vehicles, hybrids etc.
- ▶ Agriculture
  - ▶ Efficient water management practices - avoiding anaerobic emissions as well as emissions due to electricity used for pumping
  - ▶ Increasing the mix of indigenous varieties
  - ▶ Animal Feed mix control
- ▶ Waste
  - ▶ Systematic disposal to be encouraged in all small, medium cities as well
  - ▶ Harness energy from waste
- ▶ LULUCF
  - ▶ Provides opportunity for sequestration both in rural and urban areas, other than in forests

# Implementation strategy and Actions in Place

## NATIONAL ACTION PLAN ON CLIMATE CHANGE (NAPCC)

- ❖ Solar Mission : 20 GW of grid solar by 2022; 20 million sq m of collectors
- ❖ Enhanced energy efficiency - Avoid capacity addition of 19000 MW by 2015
- ❖ Sustainable habitats - Smart energy efficient buildings, Integrated transport systems
- ❖ Green India Mission- 20 million ha afforested by 2020, forest cover to go up to 23-33%
- ❖ Sustainable water management - Enhanced water use efficiency by 20%
- ❖ Sustainable agriculture - micro irrigation promotion in 40 million ha
- ❖ Sustaining Himalayan Ecosystem
- ❖ Strategic Knowledge for climate change

## STATE ACTION PLAN ON CLIMATE CHANGE

- ❖ Adaptation and mitigation strategies devised in line with NAPCC

## LOW CARBON STRATEGIES FOR INCLUSIVE GROWTH

- ❖ Transport
- ❖ Buildings
- ❖ Households
- ❖ Industry
- ❖ Power
- ❖ LULUCF

- ❖ NATCOM & INCCA
- ❖ Carbon tax on coal to fund clean energy
- ❖ Enhanced energy efficiency
  - Reduce specific energy consumption through PAT scheme focussing on 8 large industries consuming leading to a cumulative energy savings of 6.7 Mtoe in the first round by 2015.
  - An Energy conservation Fund for promoting energy efficiency measures in the industry in the offing.
  - Energy Saving Certificates and trading
  - Energy efficiency rating in 4 key appliances mandatory since 2010
  - Target to reduce 6GW of energy demand through deployment of CFLs and now LEDs
- ❖ Renewable energy push
  - Capital subsidies/ preferential tariffs
  - Renewable energy certificate markets
- ❖ Jawahar Lal Nehru Urban Mission
  - Urban Transportation, Managing MSW, waste water, recycling waste and waste to energy
- ❖ Agriculture policies
  - No extraction of water on or before a particular date before monsoon
- ❖ Soil nutrient monitoring to avoid excess/unnecessary fertilizer amendment

Ideally- A bottom up assessment is desirable



Smaller the Unit in focus- Better the manageability, & Easier Measurability, Reporting and Verifiability

# Co-Benefits of a bottom up assessment

## ▶ INDUSTRY UNITS

- ▶ Can access state of the art technology for achieving efficiency in its specific energy consumption
- ▶ Can go for international climate fund for accessing technology/NAMAS route/any other bilateral cooperation/and through private sector tie ups

## ▶ INDUSTRIAL PARKS HOUSING SME'S & INDUSTRIAL CORRIDORS

- ▶ Can set standards of energy efficient operations
  - ▶ Electricity use for lighting systems in the area and within the industrial units
  - ▶ Renewable energy Norms for pumping ground water if used
  - ▶ Energy use for factory operations- using large roof areas for generating solar energy/captive power generation-waste to heat/other renewables
  - ▶ Efficient use of Fuel directly used in production

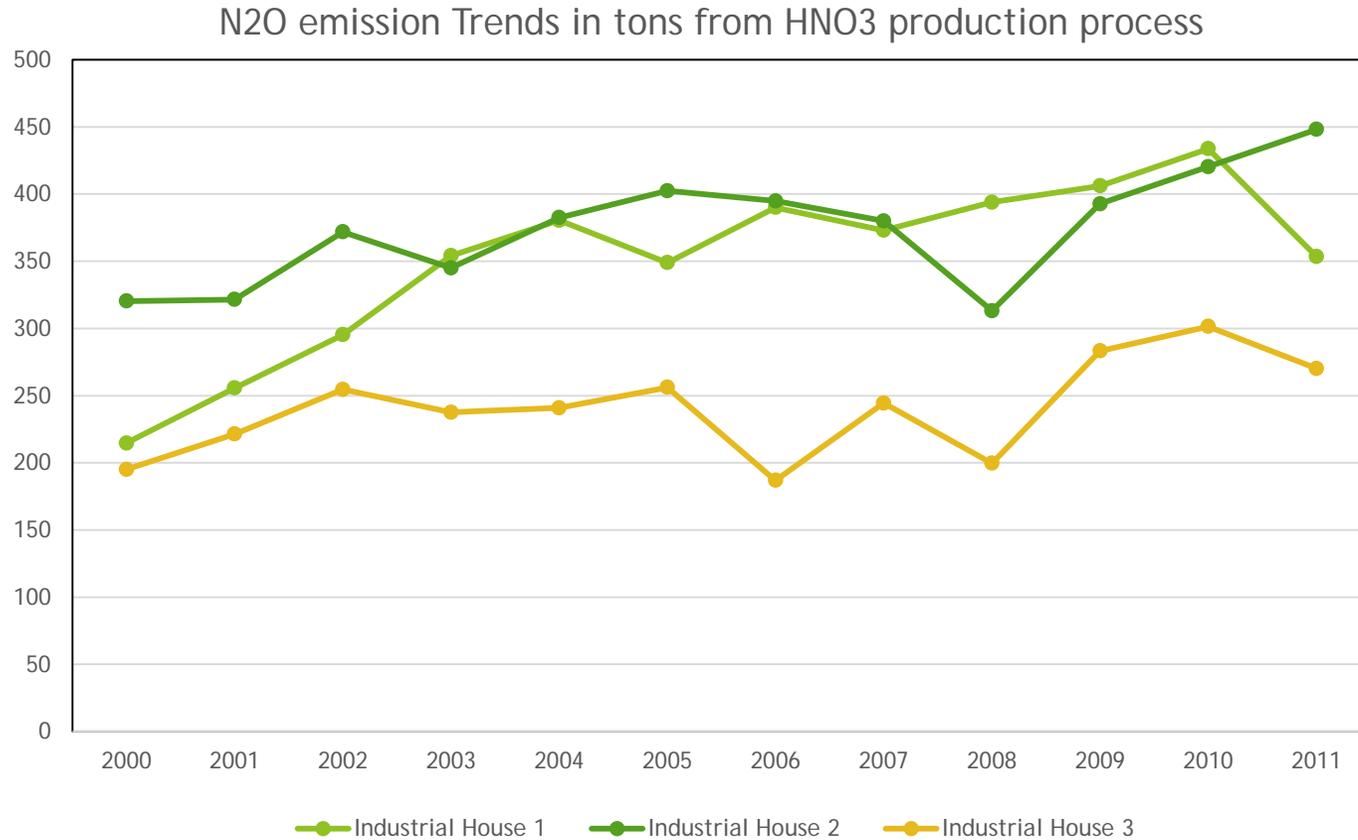
## ▶ CITY/COMMUNITY LEVEL GHG INVENTORY

- ▶ Can evolve best practices and hence enable replicate the development of energy SMART cities
  - ▶ managing energy efficient building systems (both commercial & residential)
  - ▶ growing trees in community, public and private places and harvesting them scientifically and
  - ▶ Sustainable MSW and waste water management leading to energy recovery and water recovery for reuse

## ▶ STATE LEVEL GHG INVENTORY ACCOUNTING

- ▶ Has the potential to generate competition amongst states to achieve its SAPCC targets by availing schemes under the NAPCC missions or any other

# Industry level assessment- Example



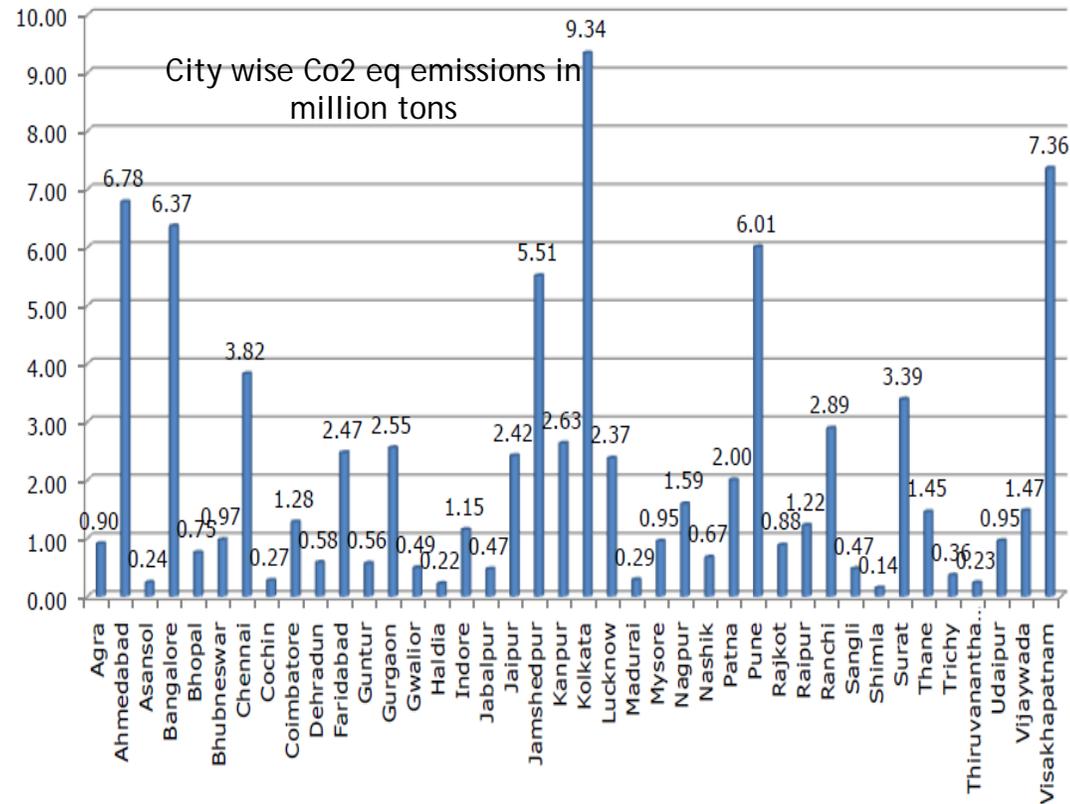
Some Gaps:

Moving from Tier I to II and III-  
As more detailed information is necessary. E.g. technology of production at times changes from unit to unit therefore uniform emission factors cannot be applied even to all units of the same industrial house unless they are available

Activity Data gaps-  
e.g. FC use are not yet available from the industry, nor the use of Carbonates available for all mineral industry sector etc.

# City level GHG accounting

► 40 cities in India have done it



Typical GHG emission distribution across cities

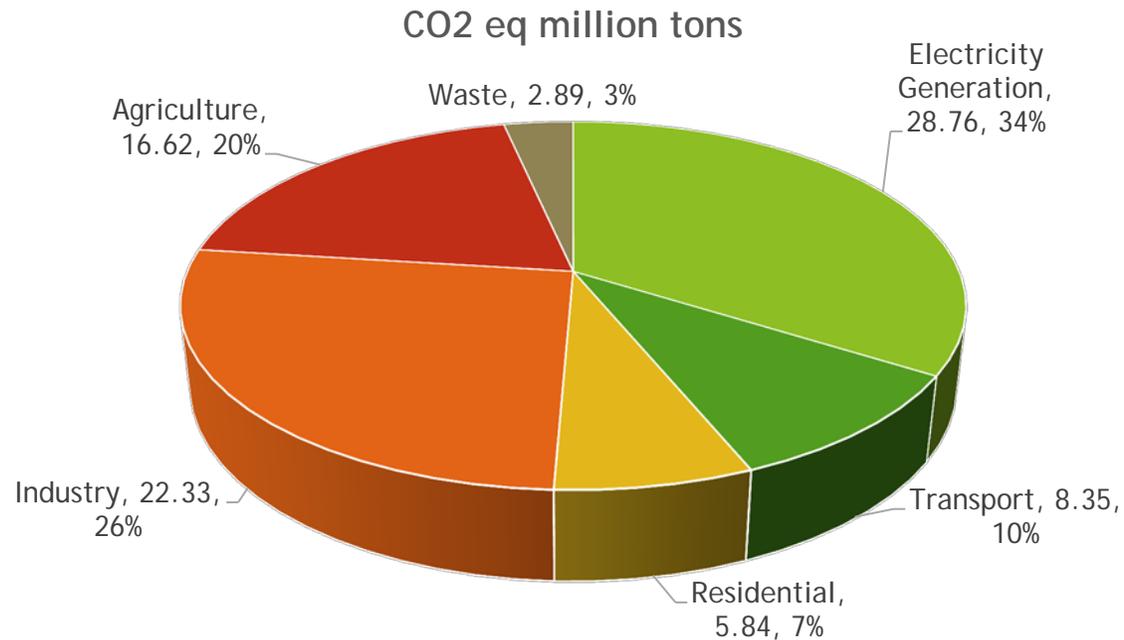
Residential	- 20-55 %
Commercial	- 05-20%
Industrial	- 10-60%
Transport	- 10-40 %
Solid Waste	- 03-15 %

Some constraints in the city level assessments

- Ever changing population of cities. In India there has been an increase in population by 53% of small and medium cities put together and 24% increase in population of mega cities between 2001 and 2011
- Defining boundary of the cities, specially which are expanding in area, such as the National Capital region of Delhi, Similarly Mumbai, and Chennai
- Activity data availability from all mapped sources of emission
- Committed interest of the relevant focal point as there is no legal commitment to develop the GHG inventory
- Scope of the sources to be included also need to be ascertained with expert consultation

# Example of a State level GHG inventory

- ▶ Karnataka State has estimated its state level GHG emission inventory and published it in its SAPCC



Industry: Cement production, Iron and steel, Ammonia, Iron ore, pulp and paper and Sugar  
Agriculture: Rice, Livestock, manure  
Waste: MSW and Industrial waste water

## Constraints

States not yet mandated to develop the GHG inventory base line

Activity data availability is a constraints

Industry emissions always do not cover all industries operating in the satate, only large emitting industries used. But smaller industries emitting high GWP gases might be the low hanging fruits that may lead to a large decrease in emissions

Trees outside forests are major GHG sequestering agents, and most of the states are not estimating the GHG inventory from this source due to complicated methodologies

# Policy gap and steps to bridge

## ▶ POLICY GAP

- ▶ Each state need to be mandated to report status of achievement of its SAPCC targets in line with the missions of the NAPCC
  - ▶ The content of the report to contain
    - ▶ GHG emission base line assessment for the year 2005-
    - ▶ GHG emission trends there after
    - ▶ Status of targets achieved and actions taken to do the same
- ▶ Therefore GHG emission inventory base line and trends need to be reported from within the boundary of the state from:
  - ▶ Industry units - large industries under the PAT scheme, medium and small scale industries under various other energy efficiency schemes
  - ▶ Industrial parks/clusters- energy efficiencies achieved in the services provided such as lighting, electricity use, quantifying switch over to renewable for diaggagated energy generation etc.
  - ▶ Cities - from efficiency in water use, lighting, energy efficient buildings, reduction in consumption of household electricity etc.

# Institutional Gaps & Steps to bridge

- ▶ No institution within the states mandated to report GHG emission inventory
- ▶ Hence institutional arrangement not established

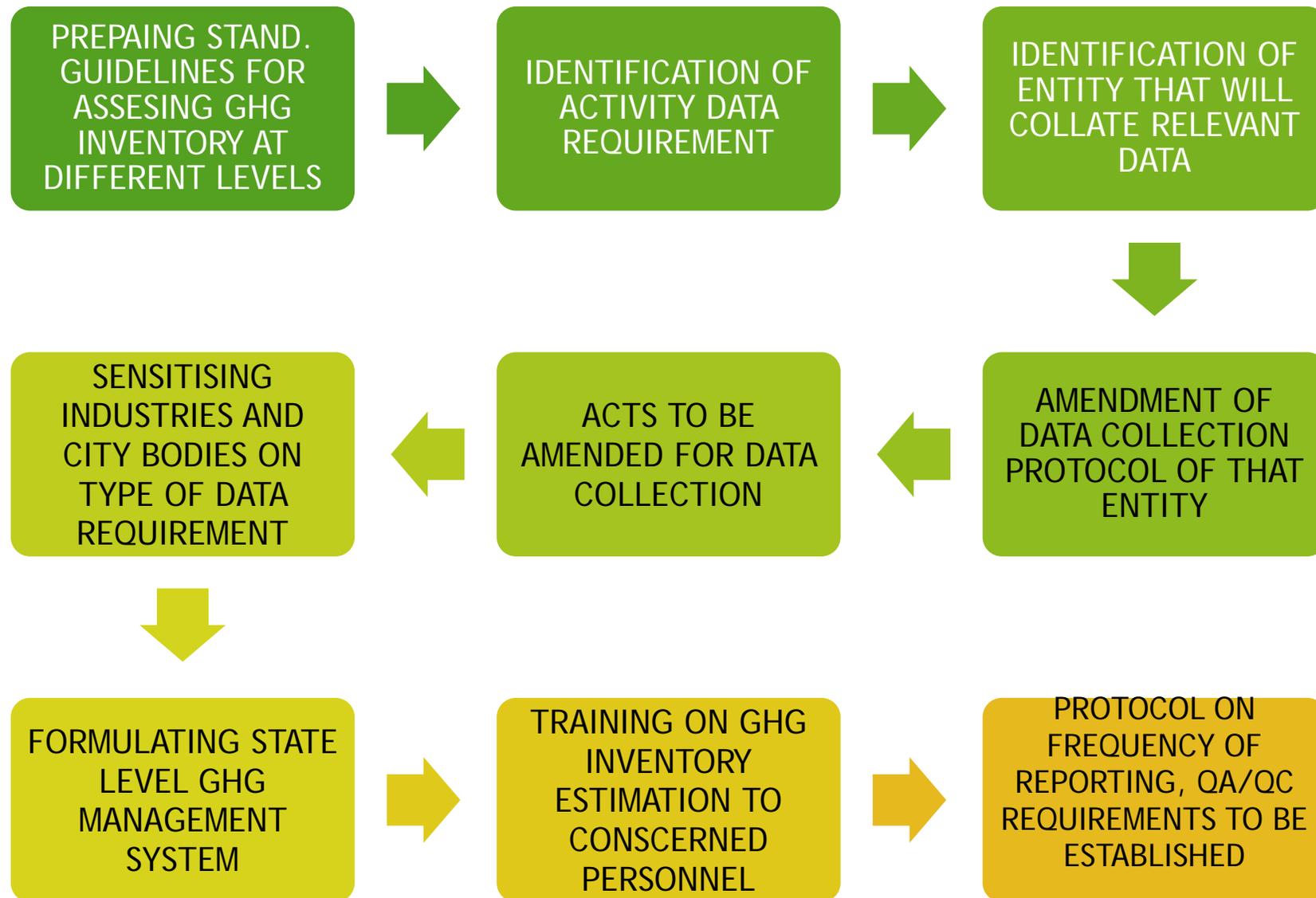
Designated Agency

- Coordination and guidance
- Collating information
- Managing GHG inventory management system

Identify the institutions that will supply activity data and estimate GHG emissions

Identify the capacity gaps

# Capacity gaps- Steps to bridge



# Financial & Technology Gaps

- ▶ Assessment required to bridge the technology gaps and capacity building requirements
- ▶ SAPCC budget estimates for actions stated cannot be bridged by Mission funds
- ▶ Each action needs to be converted into actionable project and funds sought from various sources such as the
  - ▶ International Climate fund
  - ▶ Bilateral funding
  - ▶ NAMAS facility fund
  - ▶ Raised by the private Industry etc.

# Conclusion

- ▶ Industry level, Industrial park/corridor level, City level and State level GHG emission inventories are possible ways to identify the low C pathways within their boundary of operations for moving towards a low C societies
- ▶ These level of estimates are very data intensive, and availability of this data is facilitated if a legal mandate to report such data exists at various levels of governance
- ▶ The disaggregated level of GHG inventories cannot add up to the National level GHG inventory, unless uniform methodologies are embraced by all units of aggregation
- ▶ The national policies that are towards mitigation can be tracked down to smallest level of implementation if GHG inventories at these levels are prepared
- ▶ Capacities to develop GHG inventories at sub national level are lacking at this stage for a proactive action to be taken by the cities and states

The background features abstract, overlapping green geometric shapes in various shades, including light lime green, medium forest green, and dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The overall composition is clean and modern.

Thank you

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