CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

Decentralized Organic Waste Management with Small-scale Anaerobic Digesters – A Case Study of Pune, India

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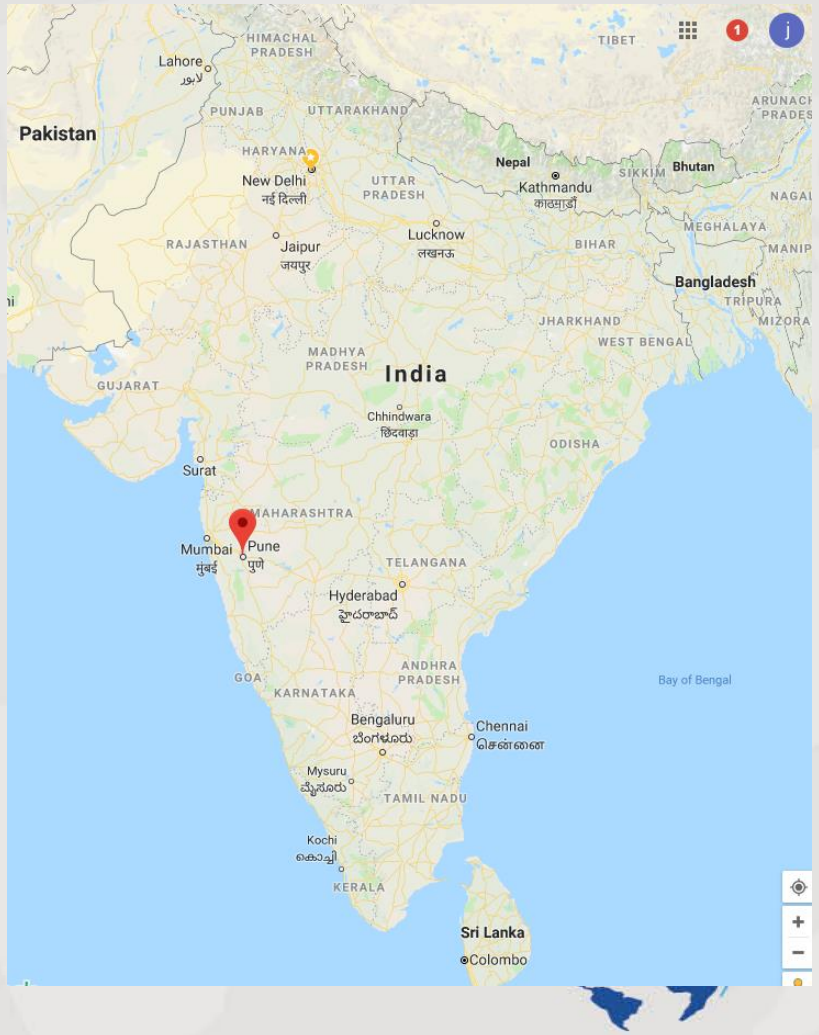
Tom Frankiewicz, U.S. EPA
Nimmi Damodaran, Abt Associates
Sourabh Manuja, TERI

Overview

- Background on solid waste management in Pune
- Pune's approach to diverting waste
- Benefits and challenges of biodigesters
- Leveraging Pune's experiences with biodigesters

Pune Context

- 8th largest city of India (2nd largest in the state of Maharashtra)
- Population
  - 6 million in 2018
  - Projected to increase to nearly 8 million by 2030



Solid Waste Management in Pune

- Generation: 2,100 metric tons of municipal solid waste daily
- Composition:
  - 45-50% organic
  - 35-40% recyclable
  - Remainder is inert
- Collection:
  - 55% - door to door
  - 12% - gate collection (directly in small truck)
  - 30% - community bins
  - 3% - unauthorized disposal locations
- Key sources:
  - Households (around 69%), hotels and restaurants (about 11%) and markets and commercial establishments (around 4%).

Solid Waste Management Challenges

- Limited disposal capacity
  - Community opposition
  - Most of Uruli Devachi landfill closed
  - Open portion receives 600 tonnes per day
- Excessive waste transportation costs
- Failure of privately operated material recovery, composting, and RDF facilities

Multiple Diversion Strategies

- Pune has adopted a suite of technologies and options in recent years to address emerging waste emergency
- Current organic waste treatment facilities
  - 3 segregation facilities (25TPD, 50 TPD, and 50 TPD
  - 1 centralized composting facility (200 TPD)
  - 13 decentralized composting facilities
  - 1 facility preprocessing organic waste for BioCNG (300 TPD)
  - 1 RDF and compost plant (300-350 TPD)
  - 26 decentralized biodigesters

Decentralized Biodigesters

- Network of 26 biodigesters
- Each processes approximately 5-10 tonnes of organic waste daily
- Technologies
  - Up-flow anaerobic sludge blanket technology
  - Conventional anaerobic digestion technology
- Some plants are operated by a private concessionaire that receives tipping fees paid by the municipality
- Contracts are for a period of five years for plants installed by the municipal corporation, and ten to fifteen years for plants installed by the private sector

Biodigester Benefits

- Reduced methane emissions (estimated by Pune Municipal Corporation as180m^3 of methane per day per 5 TPD plant)
- Biogas is used to generate electricity, which is used to power local street lighting
- Digestate is used as soil amendment to maintain local green spaces
- Reduced transportation costs by treating waste locally (estimated by PMC as Rs. 400 or about $6.00 per ton of waste)
- Reduced risk of unprocessed waste piling up due to a temporary failure of a single facility

Implementation Challenges

- Quality of the feedstock
  - Challenges with monitoring, reporting, and verification mechanisms to ensure high quality feedstock
- Operations
  - Dysfunctional scrubbers and inadequate maintenance
- Implications: frequent system down-time and low electricity output
  - E.g., electricity production at a five tpd plant using a 50 KVA generator operating less than 6 hours per day was 2.09 KWh on average - as observed in March 2018

Overcoming Challenges

- Focusing on improving operations and maintenance
- Developing an action plan for solid waste management under the Smart City initiative that employs integrated strategies to improve solid waste management in general
  - Promotes “smart” technologies to address urban challenges
  - Includes specific objectives and strategies for each aspect of the solid waste management cycle (e.g., using monitoring technologies for collection)

Sharing Pune's Experiences

- Pune is participating in the Climate and Clean Air Coalition Municipal Solid Waste Initiative
- Waste Initiative working with regional implementer, TERI, to promote Pune's achievements
- A number of other large and medium cities in India have conducted site visits to Pune and started to replicate its successful model
- TERI is identifying barriers and opportunities to extending the Pune model to other cities

Considerations for further research

- Is this a useful model?
- If so, what polices and practices were initial drivers for diversion technologies employed – and which have subsequently been successful?
- What are changes in waste flows since inception of program? Are there measureable changes in leachate and groundwater contamination?
- What information would be helpful to others in the network to replicate this approach?

Thank you! Questions?

Tom Frankiewicz
CCAC Waste Initiative Co-chair
U.S. Environmental Protection Agency
Frankiewicz.Thomas@epa.gov