Potential for Landfill Methane Recovery in Major Indian Urban Areas

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Methane to Markets Partnership Expo
New Delhi
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Overview

- M2M landfill sector activities in India
- Solid waste management practices in India
- Potential for methane recovery in India
- Development of projects in India
M2M Activities in India in the Landfill Sector

- Discussions with Government of India Ministries
- Interactions with local municipal governments
- Data collection
- Site visits
- Workshops
- Modeling
- Assessment reports and prefeasibility studies
- Identification of potential projects
Advantages of landfill methane recovery

- Reducing greenhouse gas emissions
- Improving air quality
- Reducing leachate that impact groundwater
- Improving sanitary conditions at landfill sites
- Reducing human health impacts from landfills
- Developing an alternative source of energy
Key factors affecting project development

- Waste management practices – dumpsites not landfills
- Policy and regulatory framework
- Feasibility analysis
- Funding
Lack of appropriate cover, leachate, steep slopes
Shallow waste
Fires, uneven spreading
MSW Rules 2000

- Treatment of organic fraction of waste through composting, waste-to-energy, or other state-of-the-art technology
- Final disposal of inert rejects at engineered landfill
- Sites to be identified by December 2002
- Treatment and disposal facilities (engineered landfills) to be constructed by December 2003
Current reality

- Engineered landfills
  - 24 completed
  - 322 under construction/planned

- Composting facilities
  - 275 commissioned
  - 376 under construction/planned

- Waste to energy plants
  - 37 constructed
  - 66 under construction/planned

- Loophole to allow disposal of mixed waste if alternatives are not available

- Dumpsites need to be studied for methane recovery
Data collection

- Examination of cities with million plus population
- 7 megacities
  - Mumbai, Delhi, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad
- 28 other cities
  - Lucknow, Agra, Mysore, Cochin, Jaipur, Kanpur, Visakhapatnam.....
- Proactive cities submitted data
- Incomplete data required follow up
- Consistency checks with other data collection efforts
## Data from Urban Local Bodies

<table>
<thead>
<tr>
<th>City</th>
<th>Landfill Name</th>
<th>WIP (Mg unless noted)</th>
<th>Waste Depth (m)</th>
<th>Year Open</th>
<th>Closure Year</th>
<th>Annual Disposal (Mg unless noted)</th>
<th>Waste Comp. Data?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agra</td>
<td>Shadra Landfill Site</td>
<td>600,000 m³</td>
<td>10-12</td>
<td>1979</td>
<td>2009</td>
<td>181,440</td>
<td>Yes</td>
</tr>
<tr>
<td>Ajmer</td>
<td>Makhupura</td>
<td>68,000</td>
<td>3.5</td>
<td>2000</td>
<td>2014</td>
<td>43,800</td>
<td>Yes</td>
</tr>
<tr>
<td>Bangalore</td>
<td>Devar Chikkanahawi</td>
<td>273,750</td>
<td>10-15</td>
<td>2004</td>
<td>2010</td>
<td>54,750</td>
<td>Yes (approx. #s only)</td>
</tr>
<tr>
<td>Bhopal</td>
<td>Bhanpur Khanti</td>
<td>~1,500,000 m³</td>
<td>10</td>
<td>1970</td>
<td>Unknown</td>
<td>164,250</td>
<td>No</td>
</tr>
<tr>
<td>Chennai</td>
<td>Kodungaiur</td>
<td>Unknown</td>
<td>Unknown</td>
<td>1984</td>
<td>Unknown</td>
<td>730,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Chennai</td>
<td>Perungudi</td>
<td>Unknown</td>
<td>Unknown</td>
<td>1984</td>
<td>Unknown</td>
<td>547,500</td>
<td>Yes</td>
</tr>
<tr>
<td>Delhi</td>
<td>Gazipur</td>
<td>8 million (old model); 4 million (data sheets)</td>
<td>25.5</td>
<td>1984</td>
<td>Overdue</td>
<td>730,000</td>
<td>Yes (general categories only)</td>
</tr>
</tbody>
</table>

- **WIP (Mg unless noted)**: Waste in Place (in metric tons) unless otherwise noted.
- **Waste Depth (m)**: Waste depth in meters unless otherwise noted.
- **Year Open**: Year the landfill was opened.
- **Closure Year**: Year the landfill was closed.
- **Annual Disposal (Mg unless noted)**: Annual disposal in metric tons unless otherwise noted.
- **Waste Comp. Data?**: Whether waste composition data is available.
# Data from Urban Local Bodies

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Kanpur</td>
<td>Panki</td>
<td>422,000 m3</td>
<td>3.75</td>
<td>1998</td>
<td>2006</td>
<td>438,000</td>
<td>Yes</td>
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<tr>
<td>Kanpur</td>
<td>Panki Bhavsing</td>
<td>481,000 m3</td>
<td>3.7</td>
<td>2006</td>
<td>2009</td>
<td>438,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Kanpur</td>
<td>Sanigawa</td>
<td>57,980 m3</td>
<td>6.5</td>
<td>2005</td>
<td>2009</td>
<td>438,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Kapur</td>
<td>Kapli</td>
<td>68,800 m3</td>
<td>5.5</td>
<td>2008</td>
<td>2008</td>
<td>438,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Kolkata</td>
<td>Dhapa Landfill</td>
<td>5,410,440</td>
<td>24</td>
<td>1990</td>
<td>2013</td>
<td>1,390,650</td>
<td>Yes</td>
</tr>
<tr>
<td>Lucknow</td>
<td>Barikalan</td>
<td>5,600,000 m3</td>
<td>6.5</td>
<td>1998</td>
<td>2009</td>
<td>20,000</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Site visits, assessments and pre-feasibility studies

- With potential
  - Deonar, Mumbai
  - Okhla, Delhi
  - Gorai, Mumbai
  - Dhapa, Kolkata
  - Pirana, Ahmedabad
  - Uruli Devachi, Pune

- Without potential
  - Chennai
  - Agra
  - Hyderabad
  - Lucknow
Financing

- Capping and site remediation
  - Jawaharlal Nehru National Urban Renewal Mission (JNNURM) funds for large cities
  - Urban infrastructure development in small and medium towns (UIDSSMT)

- Methane recovery projects
  - Public private partnerships
  - Asian Development Bank
  - World Bank
Conclusions

- Methane recovery projects are feasible in select cities
- Different type of projects are possible
  - Flaring
  - Direct use
  - Electricity generation
- Rules require review and possible change to reflect on the ground reality of waste management
Ahmedabad Dumpsite
Gorai Landfill
Ahmedabad Landfill
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