



# Methane to Markets

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## Potential for Landfill Methane Recovery in Major Indian Urban Areas

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**Methane to Markets Partnership Expo  
New Delhi  
March 4, 2010**

# Overview

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- 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

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- 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

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- 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

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- Waste management practices – dumpsites not landfills
- Policy and regulatory framework
- Feasibility analysis
- Funding

# Lack of appropriate cover, leachate, steep slopes

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# Shallow waste



# Fires, uneven spreading

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# MSW Rules 2000

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- 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

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- 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

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- 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

City	Landfill Name	WIP (Mg unless noted)	Waste Depth (m)	Year Open	Closure Year	Annual Disposal (Mg unless noted)	Waste Comp. Data?
Agra	Shadra Landfill Site	600,000 m <sup>3</sup>	10-12	1979	2009	181,440	Yes
Ajmer	Makhapura	68,000	3.5	2000	2014	43,800	Yes
Bangalore	Devar Chikkanahawi	273,750	10-15	2004	2010	54,750	Yes (approx. #s only)
Bhopal	Bhanpur Khanti	~1,500,000 m <sup>3</sup>	10	1970	Unknown	164,250	No
Chennai	Kodungaiur	Unknown	Unknown	1984	Unknown	730,000	Yes
Chennai	Perungudi	Unknown	Unknown	1984	Unknown	547,500	Yes
Delhi	Gazipur	8 million (old model); 4 million (data sheets)	25.5	1984	Overdue	730,000	Yes (general categories only)

# Data from Urban Local Bodies

City	Landfill Name	WIP (Mg unless noted)	Waste Depth (m)	Year Open	Closure Year	Annual Disposal (Mg unless noted)	Waste Comp. Data?
Kanpur	Panki	422,000 m3	3.75	1998	2006	438,000	Yes
Kanpur	Panki Bhavsing	481,000 m3	3.7	2006	2009	438,000	Yes
Kanpur	Sanigawa	57,980 m3	6.5	2005	2009	438,000	Yes
Kapur	Kapli	68,800 m3	5.5	2008	2008	438,000	Yes
Kolkata	Dhapa Landfill	5,410,440	24	1990	2013	1,390,650	Yes
Lucknow	Barikalan	5,600,000 m3	6.5	1998	2009	20,000	Yes

# Site visits, assessments and pre-feasibility studies

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- With potential
  - Deonar, Mumbai
  - Okhla, Delhi
  - Gorai, Mumbai
  - Dhapa, Kolkata
  - Pirana, Ahmedabad
  - Uruli Devachi, Pune
  
- Without potential
  - Chennai
  - Agra
  - Hyderabad
  - Lucknow

# Financing

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- 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

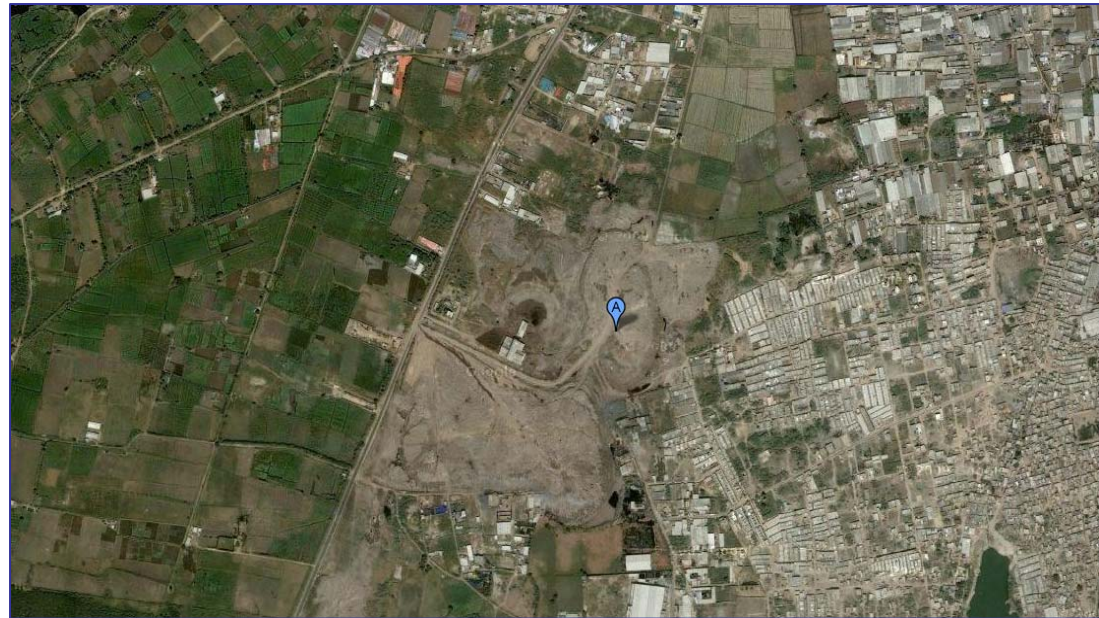
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- Methane recovery projects are feasible in select cities
- Different type of projects are possible
  - Flaring
  - Direct use
  - Electricity generation
- Rules require review and possible change to reflect on the ground reality of waste management



# Ahmedabad Dumpsite

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# Gorai Landfill

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# Ahmedabad Landfill

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# Contact Information

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