Survey on the Current Status of Municipal Solid Waste Management in Indian Cities and the Potential of Landfill Gas to Energy Projects in India

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Contents

List of Tables

List of Figures

Highlights of the Survey

- Among the class I cities the city generating the least quantum of waste is Agartala (200 TPD) and the city generating the maximum quantum of waste is Delhi (6800)
- Respondents of the survey range from small cities such as Shimla (generating 65 TPD) to Delhi (generating 6800 TPD)
- Cities generating waste above 6500 TPD lack sanitary landfills – Greater Mumbai and Delhi
- Among the class II cities, Shimla generates the least quantum of waste and Chandigarh generates the maximum quantum of waste.
- 6 out of 22 cities have sanitary landfills, which include medium sized cities such as Ahmedabad, Chandigarh, Jamshedpur, Mangalore, Surat, and Vadodara
- 45.45 % (10 out of 22) of cities do not have sanitary landfills which includes major generators such as Greater Mumbai, Delhi and Kanpur
- Gujarat emerges as one of the most active States with respect to initiatives on solid waste management as 3 cities of the State have already constructed sanitary landfills.
- Delhi, Kanpur, Jaipur, Pune. Ahmedabad, Ludhiana and Surat have emerged as cities with the highest potential for LFG
- Integrated waste management facilities are being developed in Faridabad and Lucknow
- 17 out of 22 Municipal Corporations want to undertake landfill gas to energy projects
- Only 5 out of 22 cities have conducted feasibility studies of methane emissions
- India's first landfill gas to energy project to start power generation soon in Greater Mumbai, Maharashtra
- 64.7% of Municipal Corporations lack technical know-how within the Corporation for LFG projects
- 94.1% of Municipal Corporations have sought assistance for carrying out studies for estimating waste quantification and methane emissions
- 47.3% of Municipal Corporations indicate lack of accurate estimates of methane emissions and lack of technical know-how for not initiating LFG projects

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1. Introduction

Solid Waste Management in Indian cities has emerged as a major concern over the past few years. The rise in urban population and economic growth in the absence of an effective management mechanism has manifested in the current state of solid waste management in Indian cities which is far from perfect. Given the present situation, the quantum of waste generated in cities especially larger ones with higher population is expected to increase. Greater attention needs to be focused towards devising appropriate and effective mechanisms for waste treatment and disposal in urban centres.

FICCI conducted a survey to gauge the current status of solid waste management in Indian cities and also to identify the potential for implementing landfill gas to energy projects. The survey was conducted among Municipal Corporations of 48 cities including 21 Class I[1] and 27 cities with population less than one million. Out of the 48, responses were received from 22 corporations. The results discussed in this report are based on the responses of these 22 Municipal Corporations, constituting 17 Class I cities and 5 cities with population of less than 1 million (refer to Table 1).

The 22 Municipal Corporations that responded to the survey and shared information related to Solid Waste Management were: Agartala, Ahmedabad, Asansol, Chandigarh, Delhi, Faridabad, Guwahati, Indore, Jaipur, Jamshedpur, Kanpur, Kochi, Kozhikode, Lucknow, Ludhiana, Mangalore, Greater Mumbai, Mysore, Pune, Shimla, Surat and Vadodara.

Table 1. Classification of cities which have responded to the survey

Cities with population above 1 million according to 2001 census		Cities with population less than 1 million according to 2001 census
1. Agartala 2. Ahmedabad 3. Asansol 4. Delhi 5. Faridabad 6. Greater Mumbai 7. Guwahati 8. Indore	9. Jaipur 10. Jamshedpur 11. Kanpur 12. Kochi 13. Lucknow 14. Ludhiana 15. Pune 16. Surat 17. Vadodara	1. Chandigarh 2. Kozhikode 3. Mangalore 4. Mysore 5. Shimla

The results of the survey can be broadly categorised as – the status of solid waste management in the 22 cities that responded to the survey; and the scope of landfill gas to energy projects in the cities. The report highlights the key findings pertaining to the two issues in focus and tries to identify the reasons behind the existing situation and possible solutions.

[1] Class I cities are defined as cities with a population above one million

SURVEY SNAPSHOT - PROFILING OF RESPONDENTS

- Survey results are based on the responses received from 22 Municipal Corporations
    - 17 Class I cities – Agartala, Ahmedabad, Asansol, Delhi, Faridabad, Greater Mumbai, Guwahati, Indore, Jaipur, Jamshedpur, Kanpur, Kochi, Lucknow, Ludhiana, Pune, Surat and Vadodara
    - 5 Class II cities – Chandigarh, Kozhikode, Mangalore, Mysore and Shimla

2. Status of Waste Generation and Disposal in Indian Cities

The first aim of the survey was to determine how well Municipal Solid Waste is being handled in different cities of India. By their own admission, the Municipal Corporations are ill-equipped to handle and effectively manage the large quantum of waste generated per day in the cities. The Corporations face constraints in terms of technology, know-how, manpower and most importantly adequate funds to tackle the menace. This fact was reiterated by the findings of the survey which are presented in this report. The 22 cities whose responses have been accounted for in this report represent small as well as large cities. The results therefore are fairly representative of the actual status of waste disposal in cities as small as Shimla and as large as Delhi and Greater Mumbai.

Respondents of the survey range from small cities such as Shimla, which generates 65 TPD to Delhi which generates 6800 TPD. Among the class I cities, Agartala generates least quantum of waste (200 TPD) and Delhi generates 6800 TPD of waste. Among the class II cities, Shimla generates the least quantum of waste and Chandigarh generates the maximum quantum of waste. Figure 1 and Table 2 represent 22 respondents by state and quantum of waste generation and waste disposal to dumpsite.

Cities of Ahmedabad, Delhi, Greater Mumbai, Jaipur, Kanpur, Lucknow, Pune and Surat generate more than 1000 TPD of MSW and can be classified as cities generating large quantum of waste. Indore, Ludhiana and Vadodara generate municipal solid waste between 500-1000 TPD. Cities that generate less then 500 TPD of waste include Agartala, Asansol, Chandigarh, Faridabad, Guwahati, Jamshedpur, Kochi, Kozikode, Mangalore, Mysore and Shimla.

Greater Mumbai and Ludhiana that generate 6500 and 850 TPD waste respectively (Figure 2) have indicated that they supply the entire quantum of waste collected to the landfill, whereas Kochi supplies the minimum quantum of waste to its dumpsite and most of it is composted (250 TPD generated of which only 25 TPD is sent to dumpsites).

The regional profiling in Table 2 depicts that the Western region generates the maximum quantum of municipal solid waste – 12,775 TPD. Major contributors to this are Greater Mumbai (6500 TPD) and Ahmedabad (2300 TPD). The western region is followed by the Northern region, where, quantum of waste generated is 11,263 TPD. Delhi (6800 TPD) and Kanpur (1500 TPD) are the major contributors to this total. Least quantum of waste is generated by the North-eastern region comprising Agartala (200 TPD) and Guwahati (350 TPD).

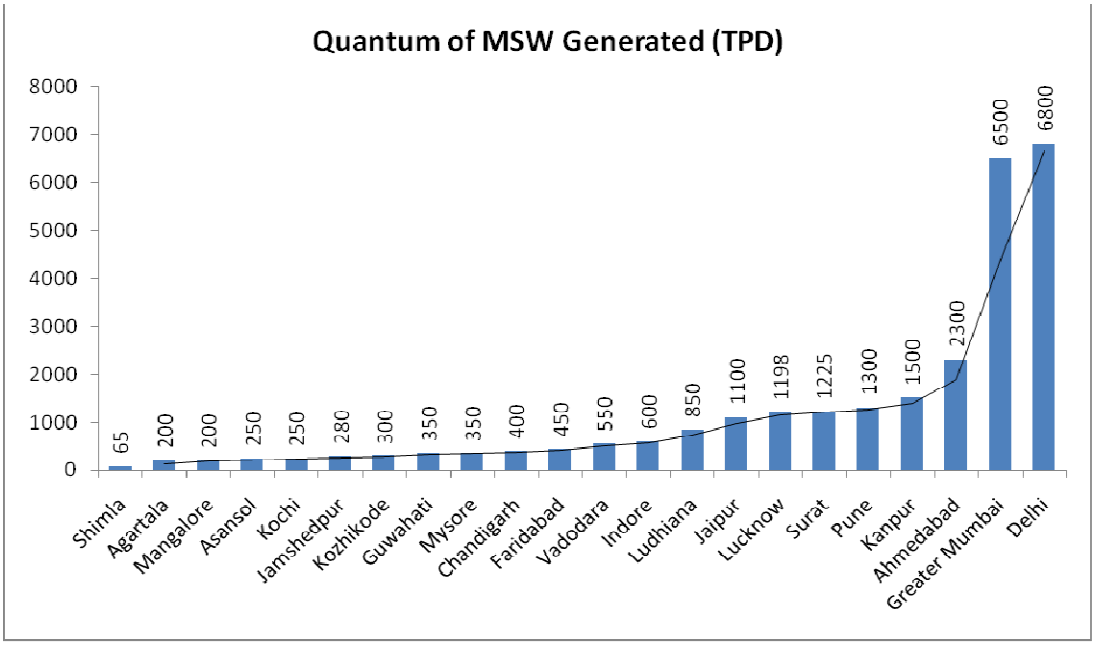
A review of the status of dumpsites in the cities shows that, out of the 17 class I cities, 8 have a single dumpsite, 5 have 2 dumpsites, 1 city has 3 dumpsites and 2 have 4 dumpsites. The survey reveals that large cities which generate above 1000 TPD of solid waste – Ahmedabad, Kanpur, Pune have a single dumpsite, whereas cities such as Asansol, Faridabad and Jamshedpur which

generate less than 450 TPD of solid waste have 2 dumpsites each. These figures bring forth the disparity in the waste management status of the cities with respect to the quantum of waste generated.

The Figure 3 depicts that Greater Mumbai and Ludhiana supply the entire quantum of waste to their dumpsites. Whereas 80-90% of waste is supplied to the dumpsite in Vadodara, Jaipur, Pune, Surat, Kanpur, Ahmedabad and Delhi. Indore supplies 54% of its waste collected to the dumpsite. Lucknow supplies 1050 TPD of the waste collected for disposal, but there is no dedicated disposal site. The waste is spread on the outskirts of the city center.

The survey also reveals that there is lack of adequate number of sanitary landfills in Indian cities. Out of the 22 surveyed cities, only 6 have sanitary landfills (Ahmedabad, Chandigarh, Jamshedpur, Mangalore, Surat and Vadodara). 10 out of the 22 cities do not have sanitary landfills and the fact that large cities like Greater Mumbai, Delhi and Kanpur are included in this list. Guwahati, Indore and Jaipur are in the process of constructing sanitary landfills; and Agartala and Lucknow are considering construction of SLFs. The city of Lucknow has been sanctioned a project under the JNNURM[2] for INR 42.92 crore, which would provide for two sanitary landfills and two composting units of capacity of 12 TPD each. This may be seen as a positive effort since Lucknow which is in the higher end of the waste generation spectrum does not even have a designated dumpsite for disposal of waste. Faridabad plans to stop using the current dumpsite and is focusing on an integrated waste treatment and disposal facility. Agartala is considering construction of a sanitary landfill even though the city generates only 200 TPA of solid waste out of which 100 TPA is being sent for disposal. Table 3 depicts the status of sanitary landfills in the surveyed cities.

Figure 1. Bar graph representing the quantum of waste generated



[2] Jawaharlal Nehru National Urban Renewal Mission (JNNURM) is a fund of INR 100,000 crores created by the Government of India for 63 Class I cities. The main thrust of the mission is on urban infrastructure and governance for infrastructural projects including solid waste management.

Table 2. Table representing States, Regions and Quantities of waste generated in cities of the respondents

S No	City	State/Union Territory	Region	Class of the City	Number of Dumpsites	Quantum of waste generated (TPD)	Quantum of waste supplied to the landfill (TPD)	Waste supplied to the dumpsite (%)
1	Agartala	Tripura	North-Eastern	Class I	1	200	100	50
2	Ahmedabad	Gujarat	Western	Class I	1	2300	1800	78
3	Asansol	West Bengal	Eastern	Class I	2	250	230	92
4	Chandigarh	Union Territory and capital of Punjab &Haryana	Northern	Class II	1	400	300	75
5	Delhi	Delhi	Northern	Class I	3	6800	6400	94
6	Faridabad	Haryana	Northern	Class I	4	450	375	83
7	Greater Mumbai	Maharashtra	Western	Class I	4	6500	6500	100
8	Guwahati	Assam	North-Eastern	Class I	1	350	150	42
9	Indore	Madhya Pradesh	Central	Class I	1	600	325	54
10	Jaipur	Rajasthan	Western	Class I	2	1100	990	90
11	Jamshedpur	Jharkhand	Eastern	Class I	2	280	240	85
12	Kanpur	Uttar Pradesh	Northern	Class I	1	1500	1200	80
13	Kochi	Kerala	Southern	Class I	1	250	25	10
14	Kozhikode	Kerala	Southern	Class II	1	300	50	16
15	Lucknow	Uttar Pradesh	Northern	Class I	No designated dumpsite	1198	1050	87
16	Ludhiana	Punjab	Northern	Class I	2	850	850	100
17	Mangalore	Karnataka	Southern	Class II	1	200	175	87
18	Mysore	Karnataka	Southern	Class II	1	350	150	43
19	Pune	Maharashtra	Western	Class I	1	1300	1000	90
20	Shimla	Himachal Pradesh	Northern	Class II	1	65	40	61
21	Surat	Gujarat	Western	Class I	2	1225	1175	95
22	Vadodara	Gujarat	Western	Class I	1	550	300	54

Figure 2. Bar graph representing the quantum of waste supplied to the dumpsite

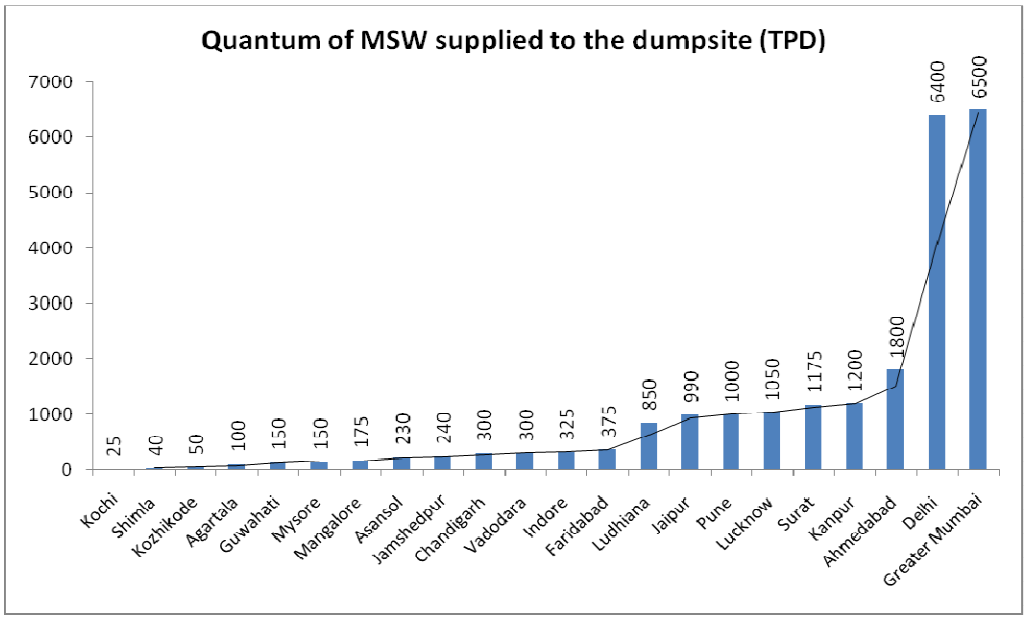


Figure 3. Bar graph representing the quantum of waste generated and the quantum of waste supplied to the dumpsite for cities generating more than 550 TPD

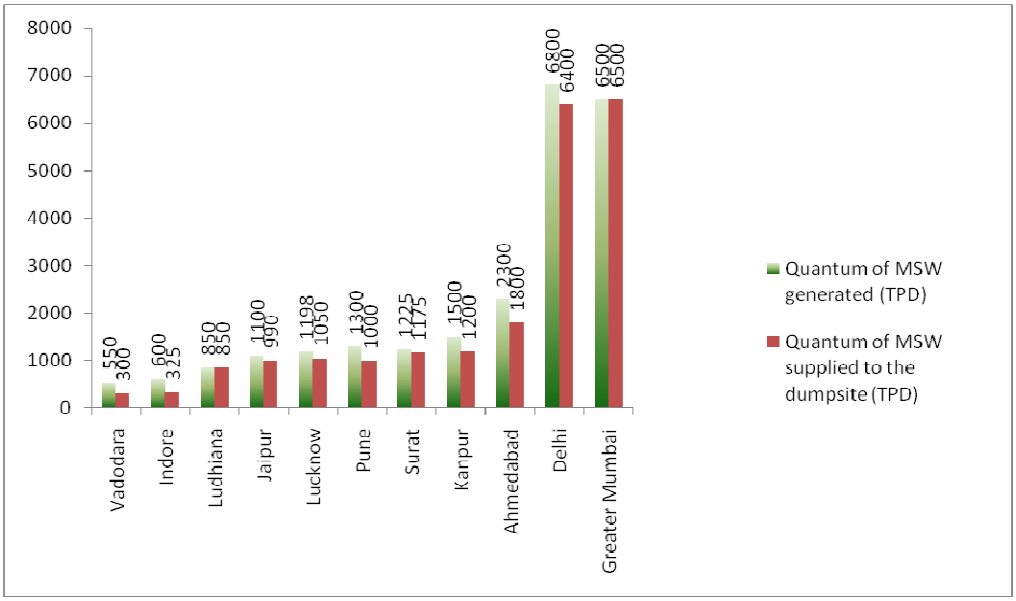


Table 3. Status of sanitary landfills

Cities having a SLF	Constructing a SLF	Cities Considering a SLF	Cities not having a SLF
Ahmedabad, Chandigarh, Jamshedpur, Mangalore, Surat, Vadodara (6)	Guwahati, Indore, Jaipur (3)	Agartala, Lucknow (2)	Asansol, Delhi, Greater Mumbai, Kochi, Kozhikode, Ludhiana, Mysore, Shimla, Kanpur (10)

The findings of the survey clearly demonstrate the lack of proper planning in relation to the solid waste status of a city and the need for including treatment and disposal facilities for urban solid waste management as part of a city's master plan. While the efforts of cities such as Agartala, Kochi, Mangalore, Surat, Vadodara etc must be acknowledged, the fact remains that the major generators like Delhi and Greater Mumbai still have a long way to go. Waste treatment options such as composting and waste-to-energy plants are not being adequately explored by even those cities which are larger not just in terms of size and population but also generation of waste. The immense scope of treatment is not being exercised due to reasons such as lack of know-how, technical manpower and most importantly financial constraints faced by the Municipal Corporations.

Greater private sector participation in Solid Waste Management could be an effective solution. The private sector could play a key role through technical and financial support to help the Government in its efforts. The private sector is better placed in terms of know-how, technology, trained manpower and finance may be encouraged to invest in waste management in India. A successful model of public private partnership can greatly enhance the chances of better waste management in Indian cities. Few states such as Gujarat and Karnataka have already taken initiatives which are slowly beginning to bear fruit. Smaller cities like Kochi are already involved in composting and among the Class I cities Surat has also set up a composting plant and has an existing engineered landfill.

SURVEY SNAPSHOTS – MUNICIPAL SOLID WASTE MANAGEMENT

Snapshot of Potential Cities

Delhi

- The city of Delhi generates 6500 TPD of waste and currently has three dumpsites, where 6400 TPD of waste is supplied.
- The city does not have an engineered landfill

Kanpur

- The city of Kanpur generates 1500 TPD of waste and supplies 1200 TPD of it to the dumpsite
- The city does not have an engineered landfill

Jaipur

- The city of Jaipur generates 1100 TPD of waste and supplies 990 TPD to its two dumpsites
- The city is under the process of constructing an engineered landfill

Pune

- The city of Pune generates 1300 TPD of waste and supplies 1000 TPD to its single dumpsite
- The city does not have an engineered landfill

Surat

- The city of Surat generates 1225 TPD of waste and supplies 1175 TPD to two of its dumpsites
- The city already has an engineered landfill and is the process of developing a second one as well

Ludhiana

- The city of Ludhiana generates 850 TPD of waste and supplies 850 TPD to its two dumpsites
- The city does not have an engineered landfill

Ahmedabad

- The city of Ahmedabad generates 2300 TPD of waste and supplies 1800 TPD to the dumpsite
- The city has two engineered landfills

Waste Generation and Disposal Status

- 36 % (8 out of 22) cities generate more than 1000 TPD of waste (Ahmedabad, Delhi, Greater Mumbai, Jaipur, Kanpur, Lucknow, Pune and Surat)
- 13.6 % (3 out of 22) cities generate waste between 500-1000 TPD (Indore, Ludhiana and Vadodara)
- 50 % (11 out of 22) cities generate less than 500 TPD of waste (Agartala, Asansol, Chandigarh, Faridabad, Guwahati, Jamshedpur, Kochi, Kozhikode, Mangalore, Mysore and Shimla)
- 63.6 % (14 out of 22) cities supply more than 75% of their waste to dumpsites (Ahmedabad, Asansol, Chandigarh, Delhi, Faridabad, Greater Mumbai, Jaipur, Jamshedpur, Kanpur, Lucknow, Ludhiana, Mangalore, Pune and Vadodara)
- Out of the 17 class I cities, 47.05 % (8) have a single dumpsite, 29.4 % (5) have 2 dumpsites, 5.88 % (1) has 3 dumpsites and 11.76 % (2) have 4 dumpsites. Lucknow does not have a designated dumpsite for waste disposal
- Greater Mumbai and Ludhiana supply 100% of the waste collected to the dumpsite

Status of Sanitary Landfills (SLF)

- 45.45 % (10 out of 22) of cities do not have sanitary landfills which includes major generators such as Greater Mumbai, Delhi and Kanpur
- 27.27 % (6 out of 22) of cities have a sanitary landfill (Ahmedabad, Chandigarh, Jamshedpur, Mangalore, Surat and Vadodara)
- Guwahati, Indore and Jaipur are in the process of constructing a SLF and Agartala and Lucknow are considering construction of SLF

3. Potential for Landfill Gas to Energy Projects

A. Methane Potential in India from Municipal Solid Waste

Methane constitutes about 29% of the total Indian GHG (greenhouse gas) emissions, while the global average is 15% (IEA, 2008)[3]. Emissions from solid waste (6%) are also proportionately higher than the global average (3%). India is one of the world's largest emitters of methane from solid waste disposal, producing around 16 Mt CO2 eq [4] per year and is predicted to increase to almost 20 Mt CO2 eq per year by 2020 (IEA, 2008). This growth in methane emissions can be attributed to rapid urbanization in India, with many people moving from rural areas into the cities resulting in an increase in amount of municipal solid waste (MSW) generated per person.

At present, the most common method employed by Municipal Corporations for disposal is dumping of the collected waste at open dumpsites. The waste at these dumpsites consists of rich organic content, which produces landfill gas over time by anaerobic digestion. Landfill gas is rich in methane (40-50%) and carbon dioxide. Gases such as nitrogen, hydrogen and oxygen are also produced in the process in insignificant quantities. The collected gas from large landfills can be effectively utilized as a clean fuel for power generation and gas collected from smaller landfills can be supplied to appropriate industries located in the vicinity of the site for direct use of gas in boilers or other equipment.

B. Potential of Feasibility Studies on Methane Emissions

To estimate the feasibility of any landfill gas to energy project, a crucial step would be to conduct a feasibility study to estimate the potential of methane emissions. This in turn would assist in planning the design and management of the dumpsite after closure. Among the responses that were received, Municipal Corporations of Delhi, Ahmedabad, Surat, Greater Mumbai and Jamshedpur have undertaken studies on methane emissions from existing dumpsites.

Guwahati generates 350 TPA of waste and transports 150 TPA to the dumpsite. The Corporation has not undertaken a feasibility study due to less quantity of waste for disposal and therefore also does not plan to undertake any LFG project in the future. It is instead treating the waste to generate RDF (refuse derived fuel).

Table 4. Cities who have undertaken feasibility studies and cities which plan to undertake landfill gas to energy projects

S No	Cities	Quantum of waste generated (TPD)	Quantum of waste supplied to the dumpsite (TPD)	Cities which *have* conducted feasibility studies to estimate methane emissions from existing dumpsites	Cities which *do* plan to under take landfill gas to energy projects in the future
1	Agartala	200	100	-	Y
2	Ahmedabad	2300	1800	Y	Y

[3] IEA, 2008- Turning a *Liability into an Asset: Landfill Methane Utilization Potential in India*, report by International Energy Association, August 2008

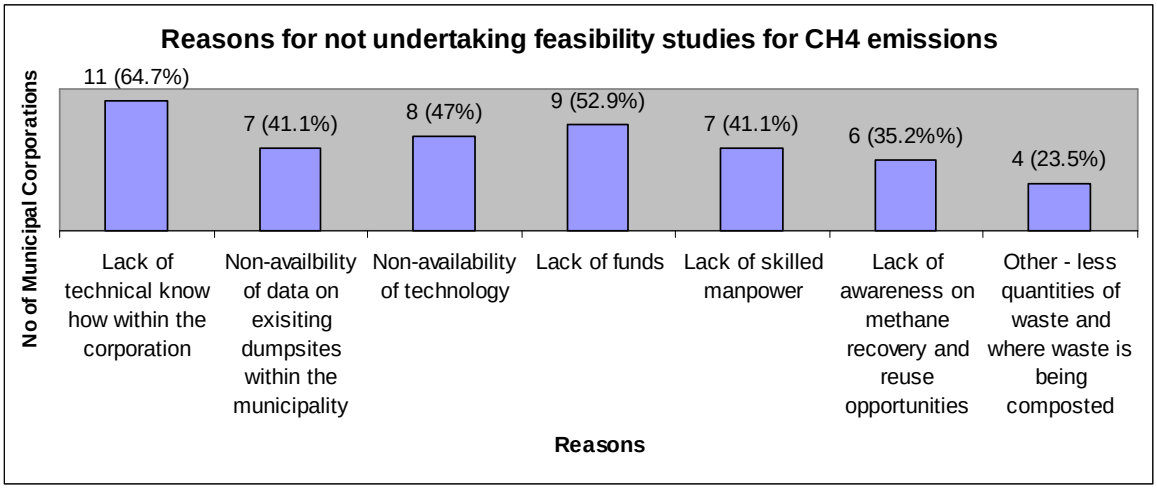
[4] Mt CO2 eq- Mega tonnes of CO2 equivalent. GHGs are measured by their relevant strength compared to CO2. Methane has a GWP (global warming potential) of 21 times that of CO2. Therefore 1 mega tonne of methane = 21 Mt CO2 eq.

3	Asansol	250	230	-	Y
4	Chandigarh	400	300	-	Y
5	Delhi	6800	6400	Y	Y
6	Faridabad	450	375	-	-
7	Greater Mumbai	6500	6500	Y	Y
8	Guwahati	350	150	-	-
9	Indore	600	325	-	Y
10	Jaipur	1100	990	-	-
11	Jamshedpur	280	240	Y	-
12	Kanpur	1500	1200	-	Y
13	Kochi	250	25	-	Y
14	Kozhikode	300	50	-	Y
15	Lucknow	1198	1050	-	Y
16	Ludhiana	850	850	-	Y
17	Mangalore	200	175	-	Y
18	Mysore	350	150	-	Y
19	Pune	1300	1000	-	Y
20	Shimla	65	40	-	-
21	Surat	1225	1175	Y	Y
22	Vadodara	550	300	-	-

As represented in Table 4, Faridabad, Mangalore, Vadodara and Jaipur do not consider it useful to undertake feasibility studies or landfill gas to energy projects in the future as they feel that after the closure of current dumpsites, methane emissions would not be generated and therefore would not like to invest in such projects. Lack of land availability is the reason stated by Shimla for not undertaking any methane emission related projects. As per Table 4 Jamshedpur has conducted feasibility study but does not plan to undertake LFG project. The reason being that the quantity of waste generated is less than 500 TPD and in open dumpsites the landfill gas available for capping is inadequate. From the responses received 72.72% (16 out of 22) of the cities do have future plans to undertake LFG projects.

17 cities out of 22 have not undertaken any feasibility studies due to factors such as lack of technical know how within the corporation, lack of funds, lack of skilled manpower and lack of awareness on methane recovery and use opportunities. Other factors include non availability of data on existing dumpsites within the municipalities and non availability of appropriate technologies.

Figure 4. Reasons for not conducting feasibility studies



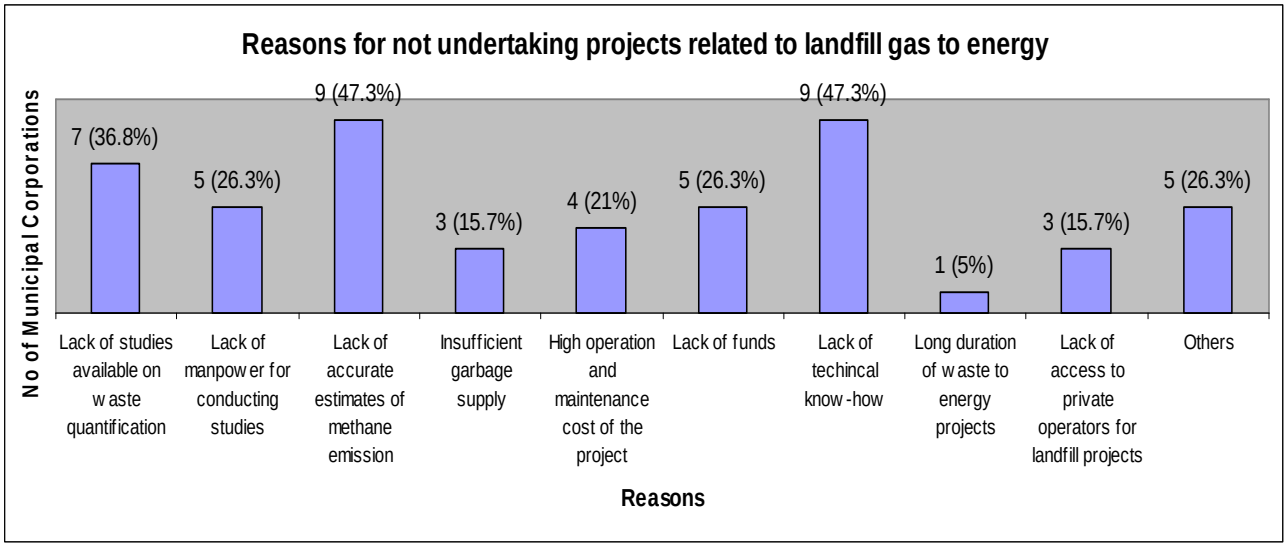
The bar graph above (Figure 4) clearly depicts that 64.7% of the respondents consider lack of technical know how within the corporation as the prime reason for Municipal Corporations to not conduct feasibility studies. This is followed by lack of funds (52.9%), non-availability of technology (47%), non availability of data on existing dumpsites within the municipality and lack of skilled manpower (41.1% each). 35% of the Corporations cite lack of awareness on methane recovery and use opportunities as reason for not conducting feasibility studies. In smaller cities like Guwahati and Agartala one of the reasons identified for not conducting feasibility studies is the insufficient quantum of waste supplied to the dumpsites.

The survey clearly reveals that Corporations feel the need of creating internal capacity through employment of skilled personnel to overcome barriers such as lack of technical know how, inability to collect information on dumpsites, and lack of skilled manpower. Corporations have indicated that availability of funds and technology need to be facilitated for them.

C. Potential for Landfill Gas to Energy Projects

From the 22 responses received, only Greater Mumbai has initiated and is in the process of developing a commercial scale landfill gas to energy project. Presently the LFG project is nearing completion and will be commissioned for commercial production of power. The power generated from the capture of methane gas will be supplied to the grid.

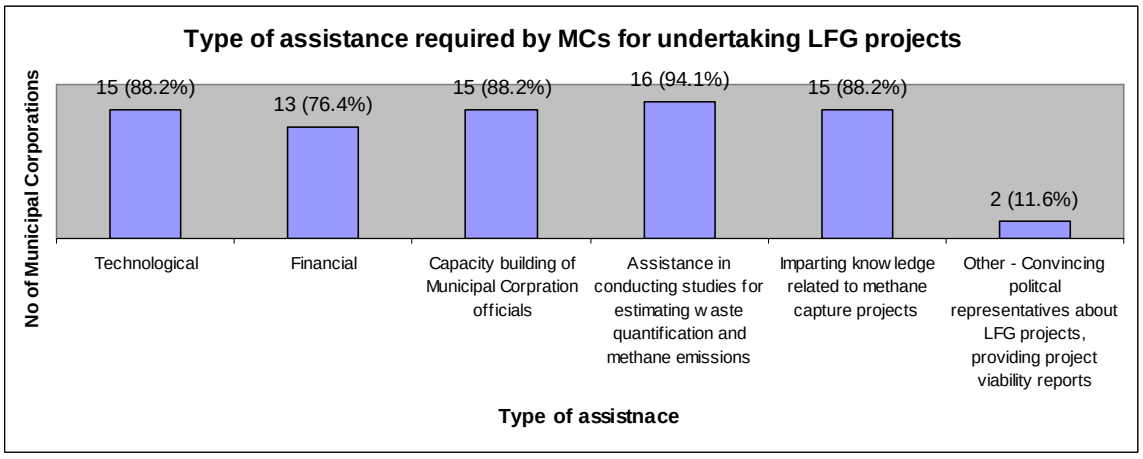
Figure 5. Reasons for not undertaking projects related to landfill gas to energy



The above Figure 5 depicts that lack of accurate estimates of methane emission and lack of technical know-how account for 47.3% of Municipal Corporations not wanting to initiate LFG projects, followed by 36.6% who cite lack of waste quantification studies as the reason. 26.3% of corporations feel that lack of manpower for conducting studies and lack of funds are the reasons that act as barriers in carrying out LFG projects.

Other factors which have been indicated by Municipal Corporations include lack of land availability, opposition by villagers, and inadequate quantity of waste generation. Only 5% of Municipal Corporations have cited long duration of such projects as a reason.

Figure 6. Assistance required by Municipal Corporations for undertaking LFG projects



However, the corporations wanting to undertake such projects have indicated that they require assistance from external organizations. Figure 6 illustrates that 94.1% seek assistance in conducting studies for estimating waste quantification and methane emissions followed by technological assistance, capacity building of Municipal Corporation officials and imparting knowledge related to methane capture projects (88.2% each). 76.4% of the respondents seek financial assistance. Indore feels that providing project viability reports would encourage

Municipal Corporations to consider LFG projects. Agartala seeks assistance in convincing political representatives about landfill gas to energy projects and its associated benefits.

There is a consensus among all Municipal Corporations who have evinced interest in undertaking landfill gas to energy projects that a visit to a successful landfill gas to energy project site would facilitate capacity building of the Municipal Corporation and first hand exposure of the operation of a LFG project.

SURVEY SNAPSHOTS: METHANE POTENTIAL FEASIBILITY STUDIES AND POTENTIAL FOR LANDFILL GAS TO ENERGY PROJECTS

Delhi

- A feasibility study has already been conducted at the three dumpsites indicating potential for LFG projects

Kanpur

- The city has not yet conducted a methane emission feasibility study due to lack of data available on the existing dumpsite within the municipality

Jaipur

- Jaipur has not undertaken a feasibility study for methane capture, since it is treating the waste by converting it into compost

Pune

- Pune plans to undertake a LFG project in the future, but faces opposition from local villagers and requires technological and financial assistance, as well as capacity building

Surat

- Surat has already conducted a feasibility study for capture of methane and the study has indicated potential for LFG

Ludhiana

- Due to lack of technical know-how within the municipality and lack of technology, the Corporation has not conducted a feasibility study to assess the potential of methane from the existing dumpsites

Ahmedabad

- A feasibility study has already been conducted at the three dumpsites indicating potential for LFG projects

Landfill Gas to Energy Potential

- Cities with the maximum potential for landfill gas to energy projects based on quantum of waste supplied to the dumpsite

- Delhi
- Kanpur
- Jaipur
- Pune
- Surat
- Ludhiana
- Ahmedabad

Status of Feasibility Studies on Methane Emissions and Landfill Gas to Energy Projects

- Greater Mumbai is the only city which has initiated a landfill gas to energy project
- 22.27 % (5 out of 22) of cities have conducted feasibility studies on methane emissions (Delhi, Ahmedabad, Surat, Greater Mumbai and Jamshedpur)
- 72.72 % (16 out of 22) of cities are interested in undertaking landfill gas to energy projects

Barriers for Landfill Gas to Energy Project Development

- 64.7 % of cities have indicated lack of technical know-how within the Municipal Corporation for landfill gas to energy projects as the prime reason for not conducting feasibility studies
- 47.3 % of corporations have indicated that lack of accurate estimates of methane emission and lack of technical know-how account for not undertaking landfill gas to energy projects
- 94.1 % of corporations have sought assistance for carrying out studies for estimating waste quantification and methane emissions

Figure 7. Matrix representing the overall status of sanitary landfills and LFG projects in India

S No	City	State/Union Territory	Class	Waste generated (TPD)	SLF			Feasibility Study	Undertaken any LFG project	Future plans to undertake LFG project	Assistance required	Converting existing dumpsites to a SLF	Visit to a successful LFG site
					Existing SLF	Considering SLF	Not interested						
1	Agartala	Tripura	I	200		☼				☼	☼	☼	☼
2	Ahmedabad	Gujarat	I	2300	☼			☼	☼	☼	☼	☼	☼
3	Asansol	West Bengal	I	250						☼	☼	☼	☼
4	Chandigarh	Union Territory	II	400	☼					☼	☼	☼	☼
5	Delhi	Delhi	I	6800				☼		☼			
6	Faridabad	Haryana	I	450			☼						☼
7	Greater Mumbai	Maharashtra	I	6500				☼	☼	☼	☼	☼	☼
8	Guwahati	Assam	I	350	☼						☼	☼	☼
9	Indore	Madhya Pradesh	I	600	☼					☼	☼	☼	☼
10	Jaipur	Rajasthan	I	1100	☼								☼
11	Jamshedpur	Jharkhand	I	280	☼			☼		☼	☼	☼	☼
12	Kanpur	Uttar Pradesh	I	1500							☼	☼	☼
13	Kochi	Kerala	I	250						☼	☼		☼
14	Kozhikode	Kerala	II	300						☼	☼	☼	☼
15	Lucknow	Uttar Pradesh	I	1198		☼				☼	☼	☼	☼
16	Ludhiana	Punjab	I	850						☼	☼	☼	☼
17	Mangalore	Karnataka	II	200	☼					☼	☼		☼
18	Mysore	Karnataka	II	350						☼	☼	☼	☼
19	Pune	Maharashtra	I	1100						☼	☼	☼	☼
20	Shimla	Himachal Pradesh	II	65								☼	☼
21	Surat	Gujarat	I	1225	☼			☼		☼	☼	☼	☼
22	Vadodara	Gujarat	I	550	☼								☼

4. Conclusion

The survey highlights the existing anomalies in the way municipal corporations are looking at the issue of solid waste management in cities vis a vis the waste generation. There is potential for setting up proper waste management infrastructure for proper treatment and disposal of waste in cities especially those which generate more than 500 tonnes per day of waste (Ahmedabad, Delhi, Greater Mumbai, Indore, Jaipur, Kanpur, Lucknow, Ludhiana, Pune, Surat and Vadodara). The existing infrastructure in cities is not adequate for management of the quantum of waste generated. There appears to be a lack of understanding of waste management practices which leads to a gap in proper planning and implementation of the available waste management options. The reasons due to which the actual efforts fall short of harnessing the existing opportunities in solid waste management are mainly the lack of knowhow, technology, trained manpower and funds.

Enhanced private sector participation could hold the key to streamlining solid waste management in Indian cities. Private sector intervention in the form of technical assistance, capacity building of corporations and information dissemination can help the authorities deal with the situation better. It is therefore important to develop a Public Private Partnership model that can yield better results and ensure that the waste generated in Indian cities is taken care of in an effective and environment friendly manner.

16 out of the 22 surveyed cities intend to undertake landfill gas to energy projects. These cities include large waste generators such as Delhi, Ahmedabad, Greater Mumbai, Indore, Kanpur, Lucknow, Ludhiana, Pune and Surat as well as cities such as Agartala, Asansol, Kochi, Kozhikode, Managalore and Mysore which generate relatively smaller quantum of waste. While the interest shown by larger generators of waste is a positive development since they have huge existing potential for landfill gas to energy projects, those cities that do not generate too much waste could manage their waste by using simpler and comparatively low cost options such as composting.

It is therefore imperative for the municipal corporations to first equip themselves to identify the loopholes and then work towards better understanding of the existing situation and adopt an effective mechanism accordingly. The interventions that could assist the municipal corporations in gearing up to achieve the long term goals of cleaner environment through proper treatment and disposal of waste in Indian cities are better inflow and dissemination of information pertaining to available waste management options and opportunities, capacity building in terms of manpower, infrastructure and technology, and finance.