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Case Study: Pirana Landfill, Ahmedabad, India – An Assessment of the Potential for Methane Gas Recovery and its Industrial Applications

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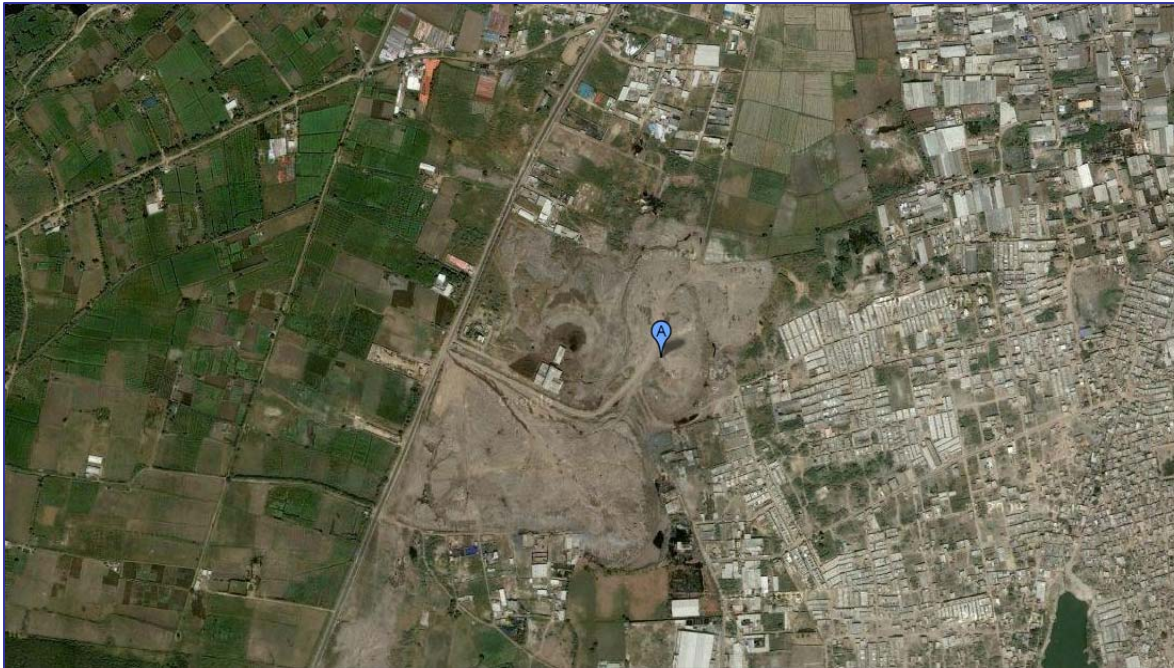
Chairman

UMC Projects India (P) Ltd.

Landfill Gas Quantity

- In order to generate a reasonable amount of methane gas, landfill should ideally :
 - Contain at least 1 million tonnes of MSW
 - Have a depth that exceeds 15 m
 - Be open or recently closed
 - Receive at least 65 cm of precipitation per year
- Not a fixed rule – combinations of these factors may yield high quality methane gas

Ahmedabad Landfill meets the above expectations



Ahmedabad Current Landfill

- City of Ahmedabad is the 7th largest mega city of India. Population is over 6 million people
- The Municipal Corporation of Ahmedabad is responsible for managing Municipal Solid Waste and Landfill

Ahmedabad Current Landfill

- Municipal Solid Waste is being disposed of at the Pirana Site admeasuring 84 hectares. The present Waste generation rate is 2400 TPD
- 400 TPD of this waste is composted and rest is landfilled at Pirana site
- 65 hectares land has been used up so far for the disposal of waste since 1980
- The average depth/height of the waste is 22 meters





Landfill Gas Potential

- USEPA has supported a pre feasibility study to access the potential of Methan Gas recovery
- The preliminary estimate 1.27 MW power plant
- The Gas recovery decline to 633 KW after 8 years
- Methane Gas estimation 600 to 850 mq / hour
- Direct use of gas by neighboring industry recommended

Favorable Factors for Direct Use

- **Energy demand similar to LFG production rate**
- **Relatively constant energy demand**
- **Geographical proximity to landfill**
- **Use of boilers, kilns, and other thermal devices**
- **Lower cost than current energy supply**

Survey Results

- 23 respondents
- Textiles, composting plant, pesticide manufacturing, fluoride grinding, ink manufacturing, and steel production
- Eighteen respondents currently receive electricity from Torrent Power

Current Energy Use

- Five respondents use boilers –
Fire tube, Package boilers and
hot air generators
 - Fuel is lignite, wood, and rice husk
 - Used for process heat
 - Near constant energy demand

- One respondent using
heater/kiln for thermal processes
 - Fuel is lignite and husk
 - Used for dryer heat



Example of Potential end users: Farchem Industries



- Dyes and spray dyeing
- Hot air boiler used for heat generation – fueled by lignite, wood, rice husk
- Boiler rating: 800,000 Kcal/hour
- Average energy use of 8 tons/day
- 24 hours of operation with marginal seasonal variation in boiler use

Example of Potential end users: Arvee Denims and Exports

- Denim, cotton, and home textiles
- Fire tube, packaged boiler for steam generation and process heat – fueled by lignite and wood
- Boiler rating: 6 MT/hr
- Average energy use: 20 MT/day
- 24 hours of operation with marginal seasonal variation in boiler use



Summary

- Ahmedabad Landfill is a promising site for Methane Gas Recovery
- End users are identified in close proximity to landfill for direct use of Landfill Gas
- Ahmedabad landfill is a good candidate for successful methane capture and use

Ahmedabad Municipal Corporation

Sanitary Landfill Site

Capacity 11.50 Lacs Metric Tones (i.e. 1.15 million tonnes), where daily off load 500 metric tones of inert waste from waste processing plants for coming 6 years, total construction cost of this site is Rs 13 Crores (i.e. Rs 130 million / i.e.

2.796 million \$, 1\$=Rs 46.50) and area used is 12.88 Hectares (32.8271 acres).

- **Total area used is 12.88 Hectares (32.8271 acres)**
- **Total construction cost of this site is Rs 13 Crores (i.e. Rs 130 million / i.e. \$ 2.796 million 1\$=Rs 46.50)**
- **Average size of shell = 262 m x 239 m = 62,618 Sq. M. (redesigned)**
- **Height of shell = 21.0 m**
 - **8.0 m below G/L (clear depth) +**
 - **6.0 m above G/L in earthen bunds +**
 - **7.0 m above earthen bunds in heap form**
- **HDPE Liner 1.5 mm thick**
- **Air Space volume available for waste accommodation = 13.45 Lacs CMT**
- **Density of compacted waste = 0.85 MT/CMT**









THANK YOU