Waste Processing Technique: Biomethanation

Presented By: Zahir Kapasi
Mailhem Ikos Environment Pvt. Ltd., Pune
MAILHEM

In Sanskrit

‘MAIL’ Means WASTE & ‘HEM’ Means GOLD

We are in the business of

converting WASTE TO GOLD
Mailhem has linked with French Lhotellier Ikos Group

Combined Experience Of Mailhem Ikos

117 years
MAILHEM WON GARBAGE GURU SAFAI GIRI AWARD 2015

Presented By Shri Narendra Modi, Hon. Prime Minister Of India
Mailhem Won National Quality Award 2012

Testimonial To Delivering Quality Products In Waste Management

PRESENTED BY
Mr. SUBODH KANT SAHAY, HON. MINISTER OF TOURISM, GOI &
Mr. ARUN MAIRA, QCI CHAIRMAN AND PLG COMMISSION MEMBER

The contents of this presentation are for general information and illustrative purposes only and are not intended to serve as financial, investment or any other type of advice.
PHILOSOPHY

- Consider “Waste as a Resource”.
- Disposal of waste at it’s source of generation.
- Seeing Is Believing
- Don’t Construct it, if you can’t Maintain it.

MISSION

To provide innovative, cost effective, one stop solution in waste management, pursue excellence, deliver quality and ensure a satisfied customer.
More than 300 plants installed and many more in the pipeline.
4R’s of Waste Management

**Reduce....**

- Avoid waste - Innovate ways to produce goods that stop waste being generated.
- Reduce waste – manufacture products that can be used productively, recycled locally, and develop ways to have minimal packaging.

**Reuse....**

- Creating new products from the old is less buen on the economy.
- Buying and using items that are reusable supports a method of waste management.

**Recycle....**

- Recycling reduces the amount of material dumped in landfill sites.
- Goods are used productively and prevented from becoming litter and garbage.
Recover...

Concept for Waste To Energy

- Waste
  - Recovery
  - Heat
  - Fuel
  - Power
What is Biogas?

• The biogas generates from bacteria that feeds on biodegradable organic material under anaerobic (without oxygen) conditions.

• In nature, biogas generation is by-product of decay of dead organic material (eg. dead leaves and dead animals) in the environment.

• Biogas is composition of methane, CO$_2$, traces of hydrogen sulphide, ammonia and water vapour.
Wondering what material can produce biogas?

All putrefying segregated organic waste can be used for biogas generation.
## Biogas Generation Potential from Various Waste

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Biogas Generation (cubic meter/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Waste</td>
<td>80 – 85</td>
</tr>
<tr>
<td>Food Processing Waste</td>
<td>70 – 75</td>
</tr>
<tr>
<td>Municipal Solid Waste (Segregated Organic)</td>
<td>55 – 60</td>
</tr>
<tr>
<td>Poultry Droppings</td>
<td>90 – 110</td>
</tr>
<tr>
<td>Slaughter House (Abattoirs)</td>
<td>90 – 100</td>
</tr>
<tr>
<td>Potato Waste</td>
<td>100 – 120</td>
</tr>
</tbody>
</table>
| Cow Dung                                     | 40 – 45                              

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Biology of Biogas Generation

PHASE I - HYDROLYSIS

PHASE II - ACIDOGENESIS

PHASE II - ACETOGENESIS

PHASE III - METHANOGENESIS

CH₄ + CO₂

Broken down into simpler form

Complex Substrate (Input Waste)

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Mailhem Ikos Offers Expertise In...

<table>
<thead>
<tr>
<th>DECENTRALISED BIOGAS PLANTS</th>
<th>CENTRALIZED WASTE MANAGEMENT PROJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Kitchen waste</td>
<td>• Large Scale Biogas Plants (above 100 TPD)</td>
</tr>
<tr>
<td>• Canteen Food Waste</td>
<td>• Anaerobic Bioreactors</td>
</tr>
<tr>
<td>• Slaughter-house Waste</td>
<td>• Refuse Derived Fuel</td>
</tr>
<tr>
<td>• Cattle Dung</td>
<td>• Incineration with pollution control equipment</td>
</tr>
<tr>
<td>• Poultry waste</td>
<td>• Windrow / Mechanical Composting</td>
</tr>
<tr>
<td>• Food processing waste</td>
<td>• Scientific Landfill</td>
</tr>
<tr>
<td>• Vegetable Market Yard</td>
<td>• Capping of existing Dumpsites</td>
</tr>
<tr>
<td>• Fruit And Flower Market</td>
<td>• Hazardous Waste Landfills</td>
</tr>
<tr>
<td>• Leather shavings waste</td>
<td>• Plastic to Fuel</td>
</tr>
<tr>
<td>• Starch effluents</td>
<td></td>
</tr>
<tr>
<td>• Co-digestion of one or more substrate from above</td>
<td></td>
</tr>
</tbody>
</table>

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Decentralised Biogas Plants
– Mailhem Ikos Way

Actual Site Photograph
Typical Layout of 10 TPD Biogas Plant

For Reference Only
3D View – Decentralised Biogas Plant
Pictorial Process Flow Of Mailhem Biogas Plant

1. Segregation Table & Organic Waste Shredder
2. Slurry Inlet cum Recycle Chamber
3. Mailhem Ikos Anaerobic Digester
4. Electricity To Streetlights & for Captive Use
5. 100% Biogas Genset
6. Mailhem Ikos H₂S Removal unit
7. Biogas Storage Balloon
8. Biogas Gas Receiving Tank

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## Salient Feature of Segregated MSW Based Biogas Plant for Power Generation Application

<table>
<thead>
<tr>
<th>Plant Capacity</th>
<th>5 Ton per day</th>
<th>10 Ton per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogas Generation Per Day</td>
<td>Approx. 275 - 300 cum/day</td>
<td>Approx. 550 - 600 cum/day</td>
</tr>
<tr>
<td>Power Generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(using 100% Biogas based Genset)</td>
<td>Approx. 420 Electrical units / day</td>
<td>Approx. 840 Electrical units / day</td>
</tr>
<tr>
<td>Organic Manure Generated (will be removed on periodical basis)</td>
<td>165 tons/ annum</td>
<td>330 tons/ annum</td>
</tr>
<tr>
<td>Liquid Organic Overflow (will be recycled to save on fresh water)</td>
<td>10 – 11 cum / day</td>
<td>20 – 22 cum / day</td>
</tr>
<tr>
<td>Area required for waste management plant</td>
<td>Approx. 450 Sq.m.</td>
<td>Approx. 800 Sq.m.</td>
</tr>
</tbody>
</table>
Actual Site Photographs of Mailhem Biogas Plants

Installed at Katraj, Pune (Pune Municipal Corporation) 5 TPD x 2 nos. (For Segregated MSW)
Installed at Ranjangaon, Pune (ITC Foods Ltd.) 20 TPD (for Potato Waste & is equivalent to 40 TPD Food Waste)
Installed at Tata Motors Ltd., Pune 6 TPD
(For Canteen Food Waste)
Installed at Bharat Electronics Limited, Bangalore
2000 kg per day (For Canteen Food Waste)
Installed at New Delhi (Indian Parliament House)
500 kg per day (For Canteen Food Waste)
Advantage of Mailhem Decentralised Biogas Plants

• Saving on cost of transportation of waste to landfill / dumping sites
• Treatment of segregated organic waste at source of generation, hence.
• Generating formal employment for rag-pickers / workers at dump sites.
• Reducing waste quantity to landfills and increasing the life of landfill.
• Empowers women in rural settings.
• Reduction in use of fossil fuel and dependence on fossil fuel.
• Improve the health quality and safety of the population and environment.
• Reduces contamination of ground water.
• Generates useful resources in terms of biogas and organic manure.
Portable Biomethanation Plants
– The Mailhem Ikos Way

Actual Site Photograph
Typical Layout of Mailhem Portable Biogas Plants
3D View – Mailhem Portable Biogas Plants
Pictorial Process Flow Of Mailhem Portable Biogas Plant

1. Food Waste Shredder / Pulveriser

2. Inlet cum Recycle Chamber

3. Feed Pump

4. Mailhem Anaerobic Digester + Biogas Storage Balloon on Top

5. Biogas Blower for pressurised cooking gas

6. Gas Pressurising Tank

7. Biogas Burner

8. Bio-manure Tank

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# Salient Feature of Segregated Food Waste Based Biogas Plant for Cooking / Heating Application

<table>
<thead>
<tr>
<th>Plant Capacity</th>
<th>500 kg per day</th>
<th>1000 kg per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogas Generation Per Day</td>
<td>Approx. 40 - 42 cum/day</td>
<td>Approx. 80 - 85 cum/day</td>
</tr>
<tr>
<td>Biogas equivalent to LPG (using 100% Biogas based Genset)</td>
<td>Approx. 16 - 17 kg / day</td>
<td>Approx. 32 – 34 kg / day</td>
</tr>
<tr>
<td>Organic Manure Generated (will be removed on periodical basis)</td>
<td>16500 kg/ annum</td>
<td>30000 kg/ annum</td>
</tr>
<tr>
<td>Liquid Organic Overflow (will be recycled to save on fresh water)</td>
<td>1000 liters / day</td>
<td>2000 liters / day</td>
</tr>
<tr>
<td>Area required for waste management plant</td>
<td>Approx. 50 Sq.m.</td>
<td>Approx. 65 Sq.m.</td>
</tr>
</tbody>
</table>

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Installed at Paradip, Orissa (Indian Oil Corporation Ltd.)
1000 kg per day (For Canteen Food Waste)
Installed at Bhubaneshwar, Orissa (Kalinga Institute Of Social Sciences)
1000 kg per day (For Canteen Food Waste)
Installed at Bangalore (Hindustan Aeronautics Ltd.)
500 kg per day (For Canteen Food Waste)
Installed at Bangalore (TCS Ltd.)
500 kg per day (For Canteen Food Waste)
Advantage of Mailhem Portable Biogas Plants

- **Indigenously developed** with in house R & D efforts over the years.
- Overflow is in liquid form from Anaerobic Digester of which **up to 75% is recycled** to save on fresh water.
- Organic sludge is taken out from bottom of Anaerobic Digester **once in 3/4 month**.
- The plant is **pre-assembled and factory tested**, hence can be installed & commissioned immediately.
- **Only flat cement bed foundation** is required to take the suitable load of plant.
- **Neat and hygienic disposal** of organic waste at its source of generation.
- **Semi-automatic operation** hence easy maintenance and less wear & tear of equipment.
- **Only semi skilled operators** required.
- This project helps in **reduction of Green House Gases (GHG) emissions**.
CONCLUSION

Ideal solution for sustainable
Waste to Energy is a judicious
mix of decentralised and
centralised Integrated Waste
Processing Projects.

MERCI BEAUCOUP