
Towards a green future

PRESENTATION ON

Biogas Plants for Food Waste & MSW

Mailhem Engineers Pvt. Ltd.

India

MAILHEM®
ENGINEERS PVT. LTD.
AN ISO 9001 : 2008 COMPANY

Disposal of Waste at it's Source of Generation

MAILHEM

IN SANSKRIT

MAIL means **WASTE** & HEM means GOLD

We are in the business of CONVERTING **WASTE** TO GOLD

We are an

ISO 9001:2008 Certified Company in Waste

Management – Biogas Plants in India.

OUR PHILOSOPHY

- Disposal of waste at it's source of generation.
- 'Seeing is Believing' - simply execute the waste treatment plants and let our Clients talk about it.
- Consider "Waste as a Resource".
- Don't Construct it, if you can't Maintain it.

We have proven what our Mission says about the QUALITY in WINNING the National Quality Award by Quality Council of India (QCI) in Environment Sector.

27 April 2012

Mailhem Won National Quality Award

April 2012

MAILHEM EXPERTISE

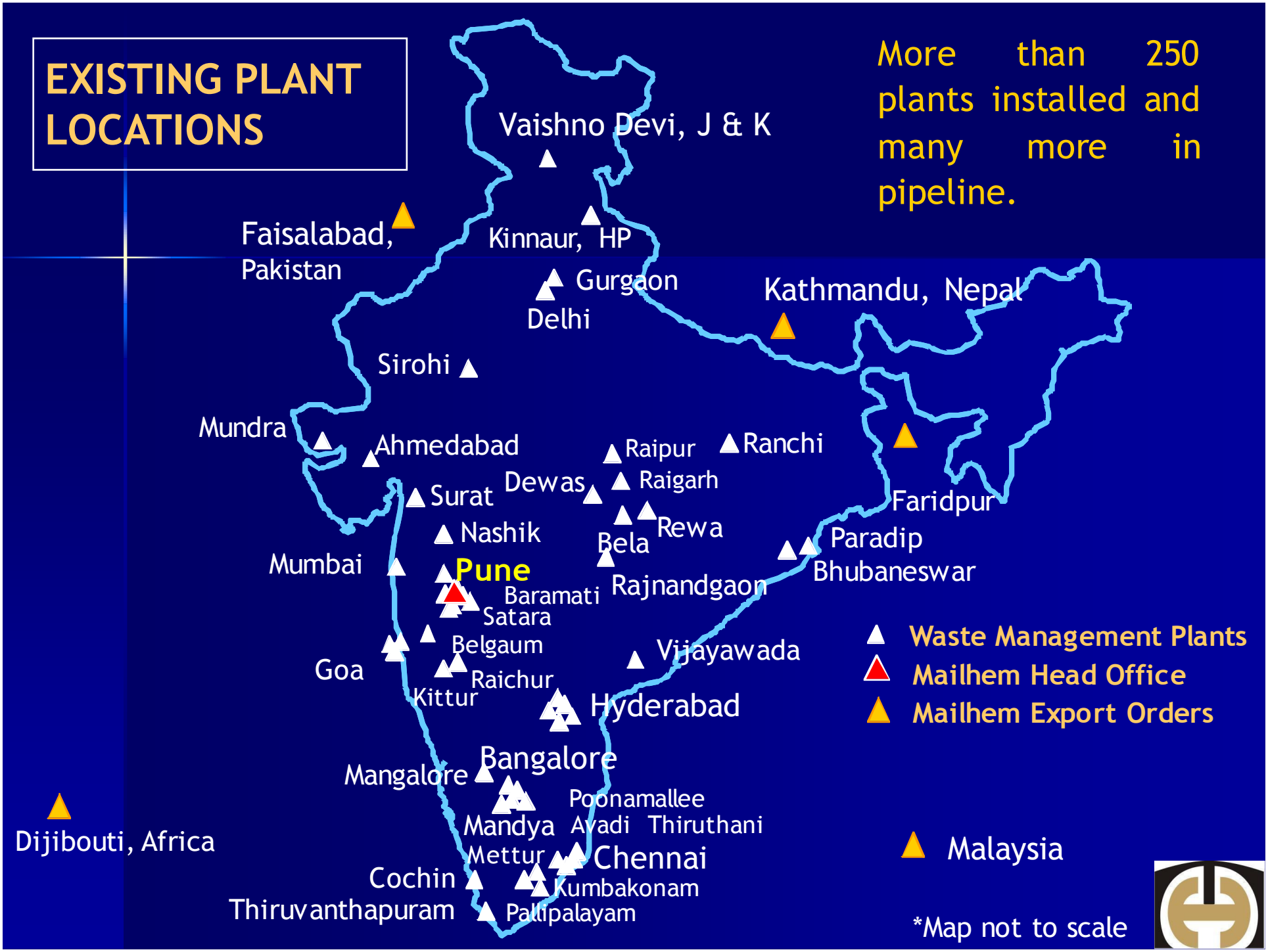
- RESIDENTIAL BIOGAS PLANTS
  - KITCHEN WASTE
  - SEWAGE WASTE WATER (Grey Water)
  - COMBINED SEWAGE (Grey Water) & KITCHEN
- INDUSTRIAL BIOGAS PLANTS
  - CANTEEN WASTE
  - COMBINED SEWAGE (Grey Water) AND CANTEEN WASTE
  - SLAUGHTER HOUSE WASTE
  - DAIRY EFFLUENT
  - LEATHER SHAVINGS WASTE
  - POULTRY WASTE
  - STARCH EFFLUENTS
  - FOOD PROCESSING WASTE

MAILHEM EXPERTISE contd…

- MUNICIPAL/MIXED SOLID WASTE BASED WASTE TO ENERGY PROJECTS

  MIXED WASTE FROM:-

  - VEGETABLE MARKET YARD
  - FRUIT AND FLOWER MARKET
  - SEWAGE SLUDGE FROM STP
  - ANIMAL DROPPINGS
  - LARGE HOTELS AND INDUSTRIAL CANTEEN
  - UNIQUE COMBINED SEWAGE AND MSW TREATMENT PLANTS FOR MUNICIPAL BODIES


EXISTING PLANT LOCATIONS
More than 250 plants installed and many more in pipeline.
Vaishno Devi, J & K
Faisalabad, Pakistan
Kinnaur, HP
Gurgaon
Delhi
Kathmandu, Nepal
Sirohi
Mundra
Ahmedabad
Raipur
Ranchi
Dewas
Raigarh
Surat
Faridpur
Nashik
Rewa
Bela
Paradip
Mumbai
Pune
Bhubaneswar
Baramati
Rajnandgaon
Satara
Belgaum
Vijayawada
Goa
Raichur
Kittur
Hyderabad
Bangalore
Mangalore
Poonamallee
Avadi
Thiruthani
Mandya
Mettur
Chennai
Cochin
Kumbakonam
Thiruvanthapuram
Pallipalayam
Dijibouti, Africa
Waste Management Plants
Mailhem Head Office
Mailhem Export Orders
Malaysia
*Map not to scale

Biogas Potential from Various Substrates

Substrate	Biogas Potential (in mesophilic range) (m^3/ton)
Food Waste	75 to 80
Cow dung	40 to 45
Fruit & Vegetable Market Yard Waste	60 to 65
Municipal Solid Waste (segregated organic)	55 to 60
Poultry Litter (fresh)	90 to 100
Slaughter house Waste	80 to 90
Potato Waste	110

END USE OF BIOGAS

- ✓ In lieu of LPG as cooking fuel.
- ✓ In lieu of Furnace Oil or HSD as boiler fuel.
- ✓ In lieu of diesel for power generation.
- ✓ Direct electricity generation.
- ✓ In lieu of CNG as vehicle fuel.

BARRIERS IN IMPLEMENTATION OF BIOGAS PLANT

BARRIERS IN IMPLEMENTATION OF BIOGAS PLANTS

1. Food/Canteen Waste

- Space constraints
- The image of conventional Gobar Gas plant has created a fear of non-aesthetic & unhygienic conditions in the premises.
- Odour nuisance.
- Requirement / Adherence to stringent safety norms.
- Reluctance to use Biogas due to its low calorific value compared to LPG / CNG.

BARRIERS IN IMPLEMENTATION OF BIOGAS PLANTS (CONTD…)

- Mental Attitude
  - Habit of disposal into municipal bins for years, so why pay for systems now?
  - Consideration of the system as energy generator rather than waste disposal system.

2. Food Processing Waste

- Quantity of waste generated is seasonal.
- Disposal as feed stock for cattle is comparatively easy way out.

BARRIERS IN IMPLEMENTATION OF BIOGAS PLANTS (CONTD…)

3. Municipal Solid Waste

- Improper segregation of waste at the source.
- NIMBY Effect (Not In My Back Yard).
- Mental Attitude.
- Lack of Awareness.

BIOMETHANATION

-THE MAILHEM WAY

TREATMENT PRINCIPLE

The basic concept of our design is based on a process known as

UPFLOW ANAEROBIC SLUDGE BLANKET (UASB)

developed by Dr. Lettingah in the Netherlands.

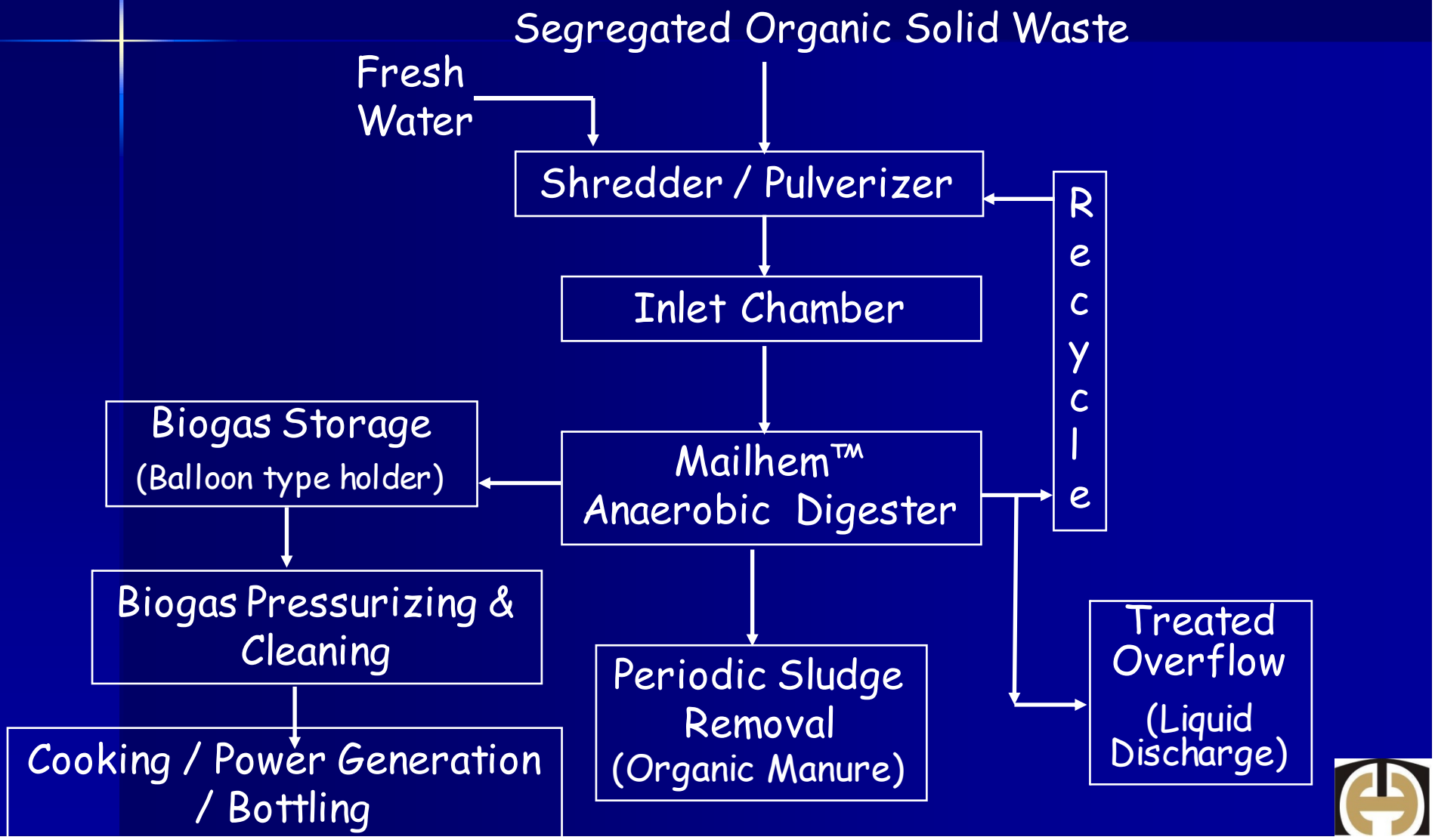
It has been specifically modified by

MAILHEM ENGINEERS PVT. LTD., PUNE.

for the waste containing high percentage of suspended solids. today, our technology is accepted as

MODIFIED UASB.

Block Diagram of Mailhem Organic Solid Waste Treatment Plant



Solutions offered by Mailhem

HSBC SOFTWARE SOLUTIONS, PUNE, MAHARASHTRA

1.	Capacity	100 kg/day
2.	Area	20 Sq.m.
3.	Year	2007-08
4.	End Use	Cooking in Canteen on 7th Floor

Special Features:-

- Compact biogas system.
- Installed next to the office building
- Aesthetic looks.

Gorkha Rifles Regimental Centre, Lucknow

1.	Capacity	300kg/day
2.	Area	40 Sq.m.
3.	year	2011
4.	End Use	Cooking in canteen

Special Features:-

- Compact biogas system.
- Aesthetic looks.
- Skid mounted system, ready to install

MTR FOODS LTD., MANGALORE, KARNATAKA

1.	Capacity	500 kg/day
2.	Area	80 Sq.m
3.	Year	2005-06
4.	End Use	Cooking in Canteen

Special Feature:-

Compact and aesthetic looks.

Installed at HAL, Bangalore, Karnataka

1.	Capacity	500kg/day
2.	Area	50 Sq.m
3.	year	2013
4.	End Use	Cooking in canteen

Special Feature:-

- Compact biogas system.
- Aesthetic looks.

Installed at MS Ramaiah College, Bangalore

1.	Capacity	500kg/day
2.	Area	50 Sq.m.
3.	year	2013
4.	End Use	Cooking in canteen

Special Features:-

- Compact biogas system.
- Ready-to-install

Installed at KVK, Baramati, Maharashtra

1.	Capacity	500kg/day
2.	Area	50 Sq.m
3.	year	2013
4.	End Use	Cooking in canteen

Special Feature:-

- Compact biogas system.
- Aesthetic looks.

MANGALORE REFINERIES & PETROCHEMICALS LTD., MANGALORE, KARNATAKA

1.	Capacity	1000 kg/day
2.	Area	100 Sq.m
3.	Year	2007-08
4.	End Use	Cooking in Canteen at a distance of approx. 0.8 km

Special Feature:-

Stringent safety norms of a petroleum refinery have been complied with.

MAGARPATTA CITY, PUNE, MAHARASHTRA

1.	Capacity	2000 kg/day
2.	Area	160 Sq.m
3.	Year	2005-06
4.	End Use	Power Generation and Cooking

Special Features:-

- Aesthetic looks.
- Segregation is carried out in an enclosed room.

WIPRO TECHNOLOGIES LTD., BANGALORE, KARNATAKA

1.	Capacity	3000 kg/day
2.	Area	260 Sq.m
3.	Year	2007-08
4.	End Use	Cooking in Canteens

Special Features:-

- Aesthetic looks – installed next to office building.
- Food Waste & Sludge from STP treated together in the system.

ARCOT MUNICIPALITY, TAMIL NADU

1.	Capacity	3ton/day
2.	Area	300 Sq.m
3.	Year	2013
4.	End Use	Power Generation for street lights

Bruhat Bangalore Mahanagar Palike, Bangalore

1.	Capacity	5ton/day
2.	Area	400 Sq.m
3.	Year	2013
4.	End Use	Power generation for street lights

Special Features:-

- Tailor – made design to fit in the space available inside city (near residential area).
- Aesthetic looks.

UAS, Mandya, Karnataka

1.	Capacity	5 ton/day
2.	Area	350 Sq.m
3.	Year	2012
4.	End Use	Power Generation

Special Features:-

- Aesthetic looks.
- Small footprint area.

UAS, Bangalore, Karnataka

1.	Capacity	5ton/day
2.	Area	350 Sq.m
3.	Year	2012
4.	End Use	Power Generation

Special Features:-

- Aesthetic looks.

Pune Municipal Corporation, Katraj Pune, Maharashtra

1.	Capacity	5ton/day
2.	Area	2011
3.	Year	400 Sq.m
4.	End Use	Power generation for street lights

Special Features:-

- Aesthetic looks.
- Tailor – made design to fit in the space available inside city (near residential area).

TATA MOTORS LTD.,PUNE, MAHARASHTRA

1.	Capacity	6ton/day
2.	Area	400 Sq.m
3.	Year	2012
4.	End Use	Power Generation to run pump

Special Features:-

- Aesthetic looks.
- Installed within the premises.

ITC FOODS LTD., PUNE, MAHARASHTRA

1.	Capacity	20 Ton/day
2.	Area	1700 Sq.m
3.	Year	2009
4.	End Use	Biogas fed to boiler

CONTAINARIZED SKID MOUNTED PORTABLE PLANTS

Mailhem - POWTP (Capacity 200 kg/day)

Exported & Installed at SEED, Nepal

Exported & Installed at Interloop Ltd., Pakistan

Mailhem - POWTP (Capacity 300 kg/day)

Exported & Installed at EPSM, Malaysia

SMALL SCALE BIOGAS BOTTLING

MALTOSE, KARNATAKA

1.	Capacity	1000 cum/day
2.	Area	750 Sq.m
3.	Year	2012
4.	End Use	Biogas Bottling

Special Features:-

- Treatment of multiple substrate in the same system.

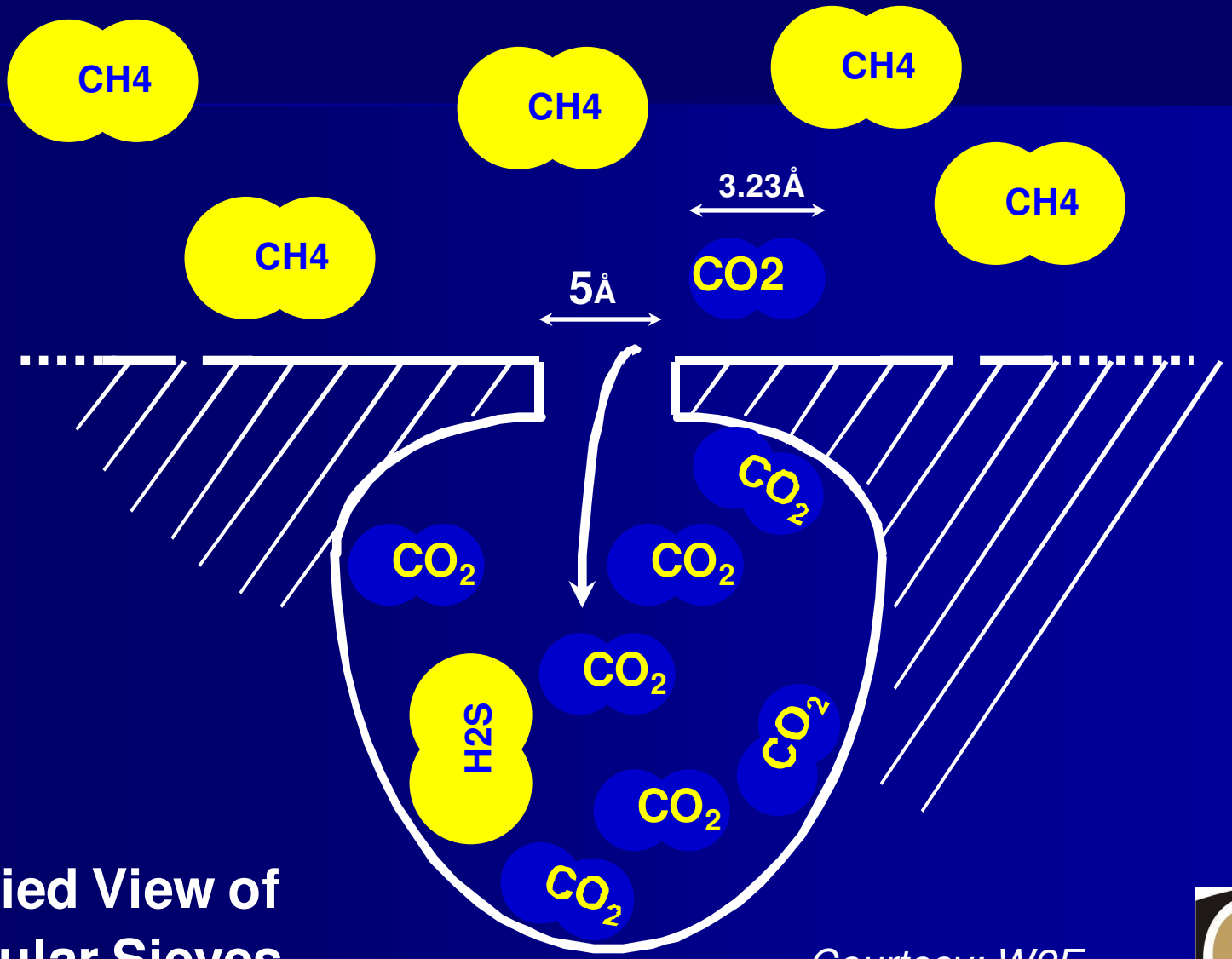
MALTOSE, KARNATAKA

PRINCIPLE OF PSA BIOGAS PURIFICATION

- PSA BIOGAS PURIFICATION SYSTEM - is the gas separation system with specially designed adsorbent.
- This adsorbent is called Molecular Sieves (MS) having a micro pore on its surface and adsorb CO_2, N_2, H_2S and H_2O molecules selectively under a certain pressure.
- After adsorption process, adsorbent is regenerated by depressurizing. These PSA systems produce the Purified Methane enriched gas continuously by repeating above adsorption and regeneration process.

Courtesy: W2E

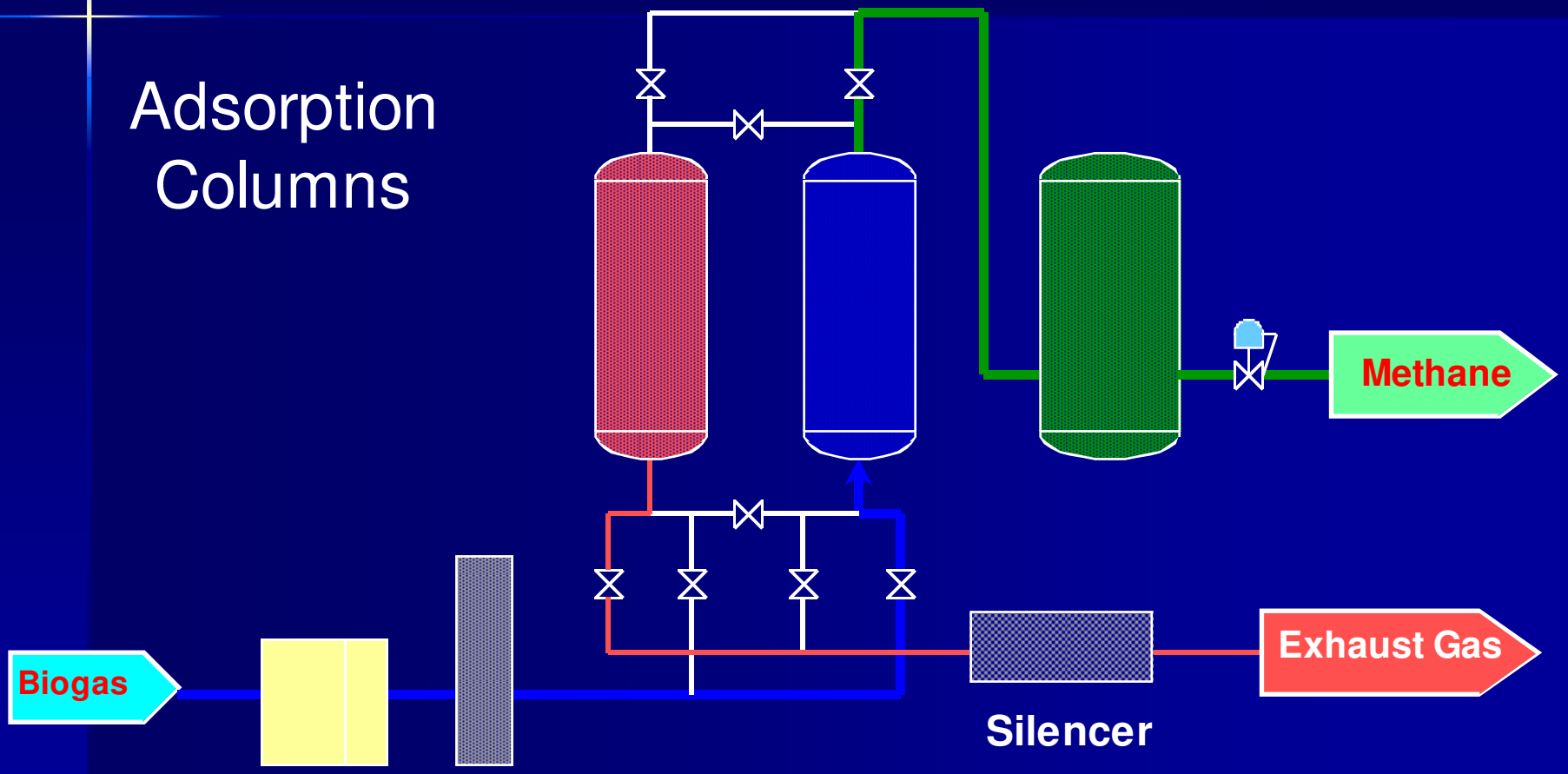
MOLECULAR SIEVES (MS)



Magnified View of Molecular Sieves

Courtesy: W2E

FLOW DIAGRAM OF PSA SYSTEM



Courtesy: W2E

A WAY FORWARD

- Need to raise awareness amongst potential customers about the benefits of alternate source of energy and at the same time impact on environment .
- Set up pilot projects on substrate not yet tried.
- More practical approach to promote projects on the part of all concerned authorities.
- Pro-active role by the nodal agencies at state level.
- Subsidies not only for capital expenditure but also for operation and maintenance.

A WAY FORWARD (CONTD...)

- Subsidies to be given on completion of project to ensure successful commissioning.
- Acceptance of completed project for subsidy within twelve months of commissioning if promoter has not applied for subsidy.

Mailhem In News

LOCAL • FAST

Pune Mirror

FUNE, WEDNESDAY, MAY 11, 2011 www.punemirror.in

AND THEN THERE WAS LIGHT

The bio-gas plant in Aundh ward, running on wet waste, is now powering more than 38 street lights near Bremen chowk, saving PMC's money, besides the ward office during outages

Sandesh.Deshpande@timesgroup.com

Passers-by along the Bremen chowk to Spicer College stretch would hardly be aware of it, but the 38 street lights that make their passage easy after dark are not adding to the Pune Municipal Corporation's utility bills. Following a fitful start in April 2010, the bio-gas plant in

Bits chokdh from Bremen chowk and Spicer College to Ambedkar chowk on the Aundh road is now lit up by street lights running on power generated through processing wet garbage

And then there was light

Opt for electricity generation from garbage, PMC told

Biogas plant on Nagar road

Mailhem In News

· FRIDAY, NOVEMBER 18, 2011 ·

THE HINDU

Two lakh visit mela

Special Correspondent

BANGALORE: All roads led to the national Krishi Mela on Thursday with a sea of farmers turning up on the second day of the five-day event.

According to estimates by the University of Agricultural Sciences-Bangalore, about two lakh people visited the event on Thursday. In fact, the number of visitors touched one lakh by 11.45 a.m. itself and gradually swelled by evening.

Referring to the spurt in number of visitors, the University authorities are confident that the number of visitors is bound to increase further in the remaining days.

Even waste doesn't go waste

B.S. Satish Kumar

BANGALORE: The University of Agricultural Sciences-Bangalore has shown the way to power-starved Karnataka by setting up a biogas unit that provides 25 per cent of electricity required by it.

The uniqueness of this project is that the entire cost spent on setting up of the biogas plant would be recovered in just about 18 months, unlike other renewable power projects which take four to seven years for the recovery of cost.

Above all, this plant generates three-phase power which is used by the university for operating its sophisticated and energy intensive equipments at the labs. The cow dung from about 175 cattle in the university, besides the food leftovers at its students' hostels serve as raw material for power generation by this plant which requires 4.5 to 5 tonnes of organic waste a day for its operation.

INNOVATIVE: *The biogas plant at the UAS-Bangalore generates three-phase power which is used by the university for operating its sophisticated and energy intensive equipment.* – PHOTO: SAMPATH KUMAR G.P.

The sophisticated plant, which was inaugurated by Chief Minister D.V. Sadananda Gowda during the national krishi mela on Thursday, generates 90 kg of cooking gas. But the university is using this gas to generate about 320 units of power a day.

Of this, 10 to 15 units account for auxiliary consumption — power required for the maintenance of the plant itself.

Kumaragouda, programme manager at the Regional Biogas Development and Training Centre of the Union Ministry of New and Renewable Energy, notes that this is the first of its kind bio-gas unit in all the universities and institutions of higher learning in the country.

The total cost of this 20-KW plant is about Rs. 40 lakh and the MNRE has provided a subsidy of Rs. 8 lakh at a rate of Rs. 40,000 a KW.

Referring to the returns, Dr. Kumaragouda explains that everyday Rs. 1,350 is earned through generation of power considering a tariff of Rs. 4.50 a unit.

It also yields three tonnes of organic manure a day which fetches Rs. 9,000 at a rate of Rs. 3,000 a tonne.

Depending upon the success of this, the university wants to set up such biogas units at all its five agricultural research stations in different parts of the State to make use of the organic waste to achieve self reliance in power supply.

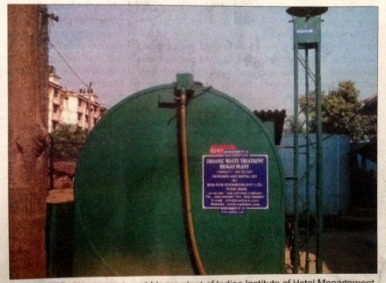
Biogas fuels IHM hostel kitchen stoves

The Indian Institute of Hotel Management (IHM) Goa at Porvorim has widely been recognized for stepping out of its curriculum and the latest such initiative is a practical demonstration on waste management and harnessing alternate resources.

In a novel approach to inculcate the importance on waste management, the IHM has been generating biogas, which is used to fuel kitchen stoves in the hostel.

The idea to impart practical training to students on waste management was conceived when IHM Goa Principal Roque D'Sousa had put forward a petition to the Board of Governors in 1997 to install a bore well in the college campus, as the institution faced acute water shortage.

D'Sousa felt that a bore well would be the best and a long-term cost measured solution to the institution, given the water requirement which was close to 20,000 ltrs per day.



FUEL TO FIRE: Waste treatment biogas plant of Indian Institute of Hotel Management at Porvorim.

Accordingly, a bore well was dug and the bore well powered with a 5-HP motor and yielded sufficient water for nearly 1,000 students and faculty and for cleaning and irrigation purpose.

This was IHM Goa's first step as an educational institution towards renewable resource management.

The second pilot project commenced in 2003, where a realization of waste water treatment set in as the growing student rate and the round-the-clock activities gave rise to overflowing soak pits and septic tanks.

A petition was made to PWD to install a treatment plant and heed was paid only in January 2004, with Mailhem Engineers Pvt Ltd Pune entrusted with the project.

The sewage and all drains were then connected to the plant, where a segregation of solid and liquid waste was carried out and the liquid waste was thereafter sent for treatment.

The project was another triumph catering to needs

ANIL SHANKHWALKER

PORVORIM

of the college by providing yet another alternative for varied necessities of the institute.

By 2010, the college made a provision for the plant to be upgraded to a 55,000 ltr capacity tank to cope with the increase in students.

With this investment, the college managed to save on expenses not only on water bills, but also on LPG.

The treated water was solely used for irrigation and is evident with the wide floral spread in the campus, ranging from fruit plantations to vegetable cultivation.

In an ongoing effort to becoming eco-friendly, the IHM principal sought sanction to have a Portable Anaerobic Waste Disposal Plant (PAWDP) for treatment of all solid waste from various production sites and a Water Disposal Plant.

Mailhem Engineers Pvt Ltd once again won the contract to set up a 300 kg/day organic waste plant to produce biogas of approximately 20-22 cum per day and bio-manure of approximately 10 tonnes per annum.

According to IHM officials, garbage is first segregated into non-degradable and biodegradable waste. Biodegradable waste is later sent to the tank for processing and biogas is used to fuel kitchen stoves in the hostel.

The large quantity of biogas produced every day helps to prepare the daily meals of 200-odd boys in the IHM hostel.

GKVK campus to have biogas power plant

DNA Correspondent

Nothing goes waste

Here's a lot of news that civic authorities and producers of large quantities of organic waste should sit up and take notice. The University of Agricultural Sciences (UAS) is set to inaugurate a biogas power generation plant at the GKVK campus. This is the first of its kind on any university campus in the country.

There are package plants that can handle as little as 50kg to 300kg. These can be assembled anywhere. All it requires is 20x20 sqft space, water and electricity. However, it is not viable to equip small plants for electricity generation, says KC Achappa, a general manager at the Mailhem Engineers company that is executing the project on the GKVK campus. "The generator engine costs ₹2 lakh to ₹3 lakh. It is not viable for smaller plants. You need at least one tonne of cowdung to extract power," he said.

One tonne of cowdung can yield 40-50cubic metre biogas per day. Such a plant would cost ₹17lakh-₹18lakh plus about ₹2.5 lakh for the engine. A tonne of food or other waste can give 70-80 cubic metre of biogas. If you go in for a biogas plant of 500kg of food waste, you can plan for power generation: you will get 40cubic metre of gas and can generate 60 units per day. The plant itself consumes only 6-7 units a day. Such a installation will cost ₹10-12 lakh, said Achappa.

The potential of such a facility is immense, especially for cities with huge amounts of organic waste. "Pune already has five plants of one tonne each. This is used for street lighting," he added.

In the last 18 years, the company has set up 300 biogas plants all over India. "We have put up plants in Parliament and a five-tonne plant in the Hampi heritage centre," he says.

While GBS runs has a biogas plant, the city's civic authority, which claims to handle over 1,500 tonnes of solid waste every day, is yet to make progress. The university plant will be inaugurated during the Kuvempu Krishi mela, which begins today.

Waste Picking in Africa

India's waste pickers

COUNTRY PRESENCE

HEAD OFFICE, PUNE, India

Administration cell

Marketing & Sales

Research & Development

Design & Engineering

Operation & Maintenance

Bio-culture preparation

WORKS: SANASWADI, PUNE, India

Fabrication in MS, SS, FRP, & HDPE

Engineering

Pilot Plant studies

REGIONAL PRESENCE

Hyderabad

&

Bangalore

Marketing & Sales

Regional Administration

Project Execution

Operation & Maintenance

GLOBAL PRESENCE

SUBSIDIARY COMPANY

EAST ASIA

Mailhem East Asia Pte Ltd.

Singapore

Thank You

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