



Biomethanation from Municipal Solid Waste

Mahesh Pathak, Municipal Commissioner, PMC



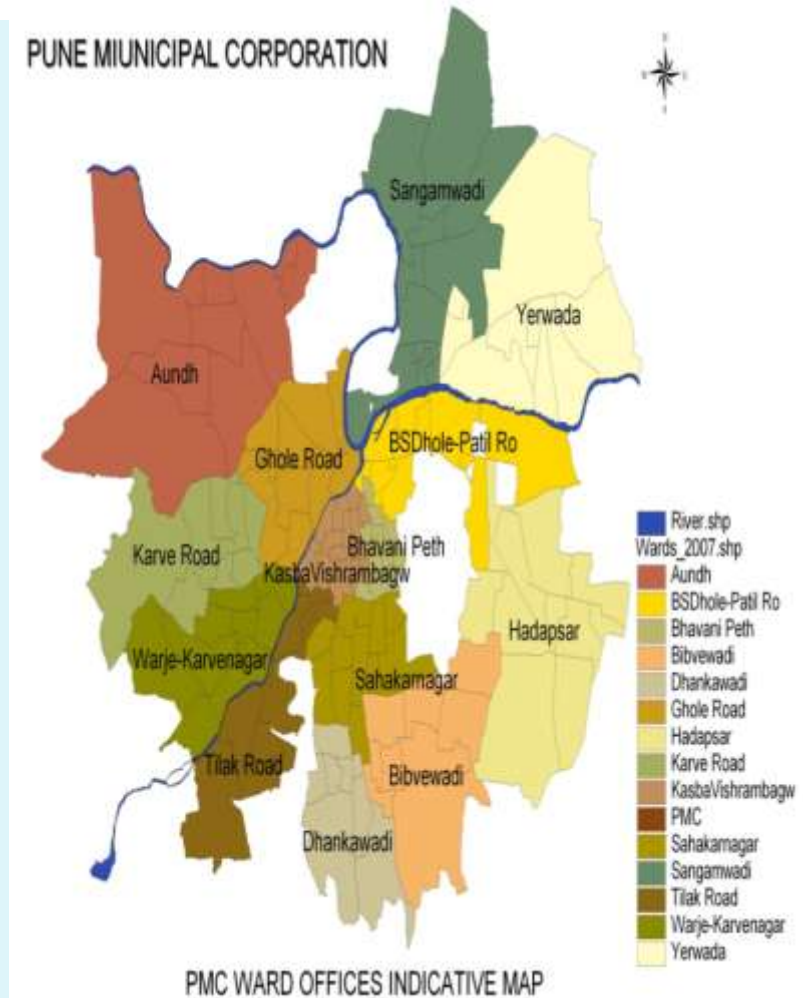
Power Generation from
Solid Waste Generated in
Suburban Area using
Spatial Techniques -
Refuse into Resource
through Biogas”



Pune City



- Pune is the 8th largest city in India and the 2nd largest in the state of Maharashtra.
- Population ; about 4 million
- Households ; nearly 1 million
- Area of city is 244 sq. kms.
- 4 Zones ; 15 Administrative Ward Offices ; 76 Prabhags

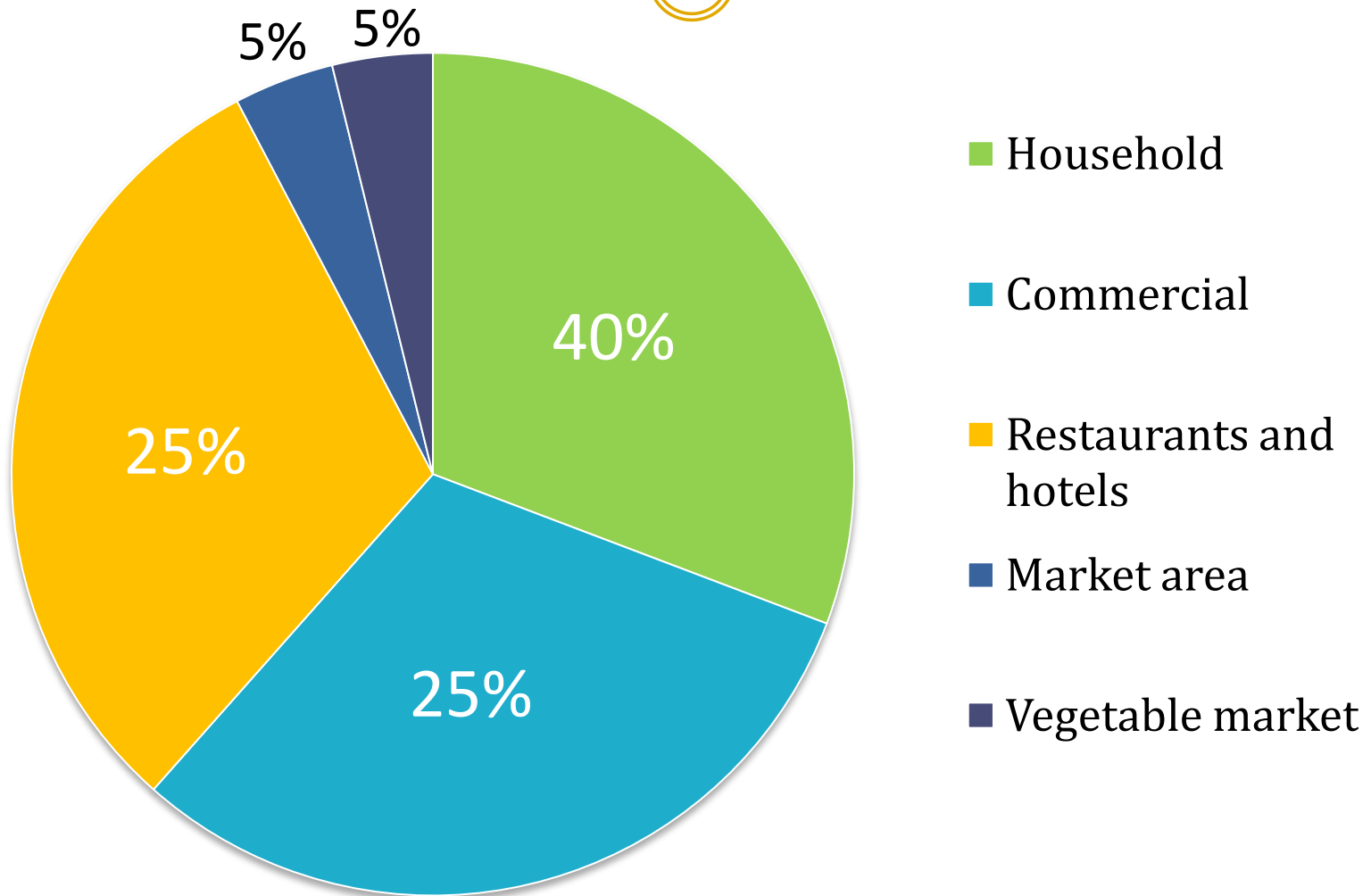


Overview of Waste Management



- Pune generates 1500 to 1600 tons of solid waste per day.
- 158 trucks collect waste door-to-door, collecting an average of 197 tons per day.
 - 55-60% of households have door-to-door coverage.
 - 44% of households provide segregated waste.
- 973 containers and 203 compactor buckets dispersed around Pune.
- SWaCH Cooperative, which is wholly owned by waste pickers, also provides services.
- Ward wise average- 350 to 750 gms per capita per day

Sources of waste generation



MSW Characteristics



Description	Percentage
Organic Matter	45 to 50
Recyclables from Residential & Commercial	35 to 40
Inert Material	10 to 15
Other Parameters • Density • GCV • C/N	• 437 Kg/m³ • 937Kcal/Kg • 22.85

Transportation



Vehicle Name	Nos.
Tipper Trucks	158
Compactors	12
Hotel Trucks	23
Tractors	10
Dumper Placers	89
Bulk Refuse Carrier (B.R.C.)	65

Best Practices to Generate Wealth Out of Waste



- No open dumping and 100% scientific processing of waste
- Integrating Informal Sector in Municipal Solid Waste Management
- Pune's Trash Solution: A Zero Garbage City
- Biomethanation cum power generation plants
- Waste to energy – Plasma gasification
- Mandatory onsite disposal in post 2000 residential and commercial schemes

Best Practices (Cont.)

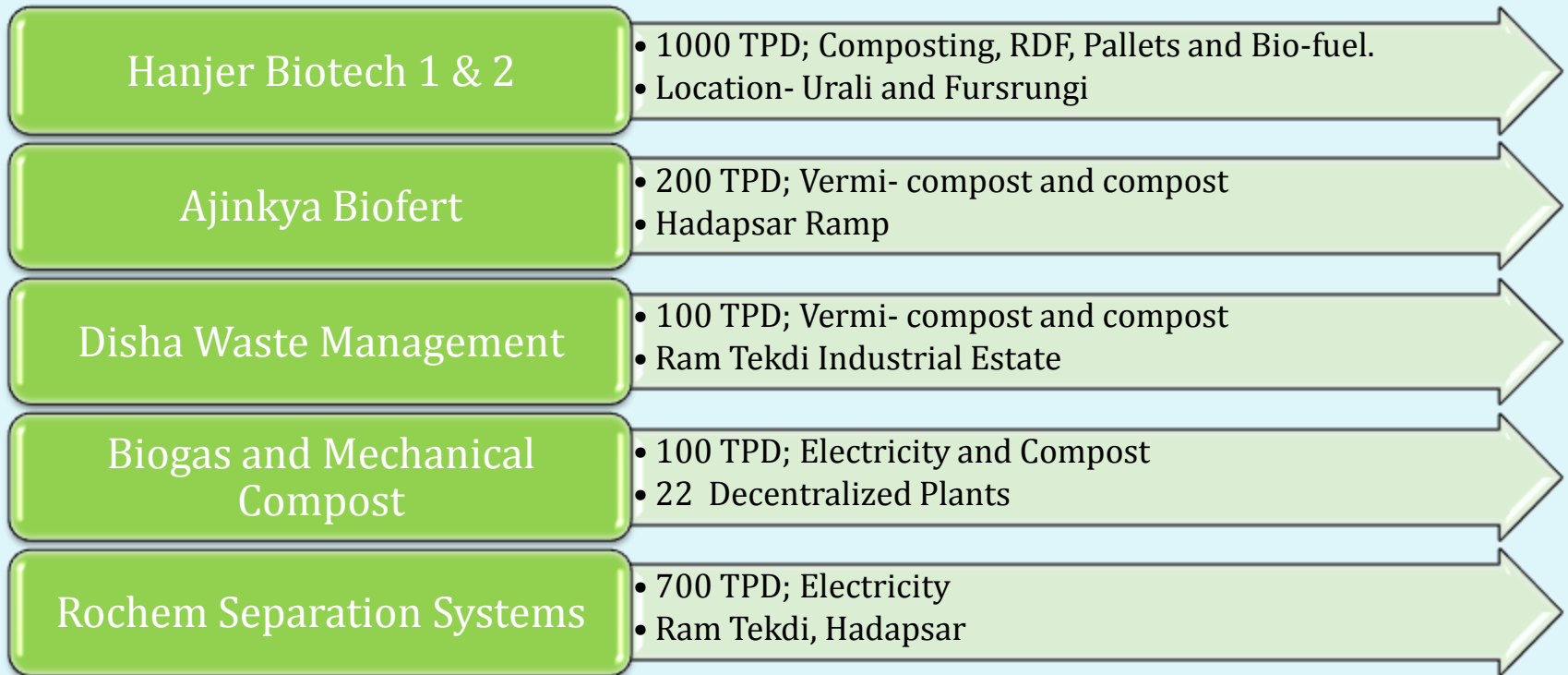


- Loknete Yashwantrao Chavan Pune City Clean Drive
- Data collection for MIS using Mobile SMS
- ALERT G-Complaint Redressal through citizens participation
- Celebration of Ganesh Utsav in Eco friendly manner
- Sonia gram udyog prakalp for plastic recycling
- Shredding and composting of garden waste

Current processing of waste in Pune



- No open dumping since June 2010; scientific processing only.
- Decentralized waste processing plant.



Biomethanation of Organic Waste



- 40-45% urban solid waste is the organic can be easily treated by anaerobic digestion.
- Solids in the organic waste decompose rapidly and can be treated by biomethanation process method
- Solid waste is treated in closed vessels where, in the absence of oxygen microorganisms break down the organic matter into a stable residue, and generate a methane-rich biogas in the process.
- This biogas can then be used as a source of renewable energy to produce electricity.
- Solid residue can be utilized as manure

Energy Generation Details



Description	Value
Biogas Generation	300+5% m ³ /day
Calorific Value	4800-5000 Kcal/cum
Engine Efficiency	25%
Electricity Generation	1.5 kWh/cum of Biogas
Equivalent Electricity Generation	450kWh/day
Auxiliary Power requirement	@50 kWh/day
Net Surplus Electricity for sale	400 kWh/day

Decentralized Biomethanation Plants

Sr. No	Location of Biomethanation Plants	Capacity of Plant
1	Aundh Ramp	5 TPD
2	Maharashtra Board Yerwada	5 TPD
3	Tingre Nagar	5 TPD
4	Peshwe Park-2	10 TPD
5	Hadpsar Ramp-2	10 TPD
6	Katraj Ramp-2	10 TPD
7	Bavdhan	5 TPD
8	Katraj Gaothan	5 TPD
9	Model Colony	5 TPD
10	KK Market	5 TPD
11	Ghole Road Ramp	3 TPD
12	Wanowari	5 TPD
13	Taljai-2	10 TPD
14	Baner	5 TPD
15	Yerwada Mental Hospital	5 TPD
16	Dhyari Smashan Bhoomi	5 TPD



वातवर्दी वायो गॅस प्रकल्प (क्षमता: ६ मे. टन प्रतिदिन)



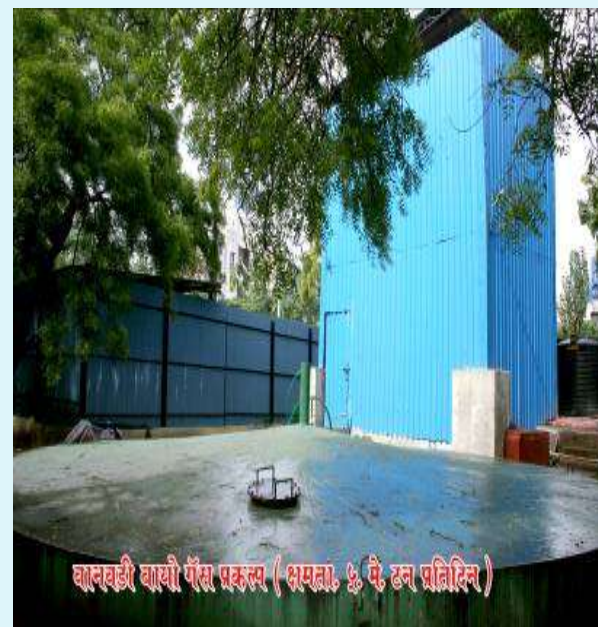
वावधन वायो गॅस प्रकल्प (क्षमता: ६ मे. टन प्रतिदिन)



पेशवे बार्न वायो गॅस प्रकल्प (क्षमता: ६ मे. टन प्रतिदिन)



कावज २ वायो गॅस प्रकल्प (क्षमता: ५ मे. टन प्रतिदिन)



वातवर्दी वायो गॅस प्रकल्प (क्षमता: ६ मे. टन प्रतिदिन)

Direct Income/Savings

	Single Plant Capacity	Total 20 Plants Capacity
Plant Capacity	5 TPD	98 TPD
Income from Savings in Electricity	Rs. 6.57 Lacs	Rs. 128.77 Lacs / Year
Income from sale of manure	Rs. 3.30 Lacs/Year	Rs. 64.68 Lacs/Year
Total Income	Rs. 9.87 Lacs/Year	Rs.193.45 Lacs/Year

Income/Savings

	Single Plant Capacity	Total 20 Plants Capacity
Plant Capacity	5 TPD	98 TPD
Savings in current Transportation to centralised plant.	Rs. 2000 /Day * Rs.7.30 Lacs/Year	Rs.39200 / Day Rs.143.08 Lacs/Year

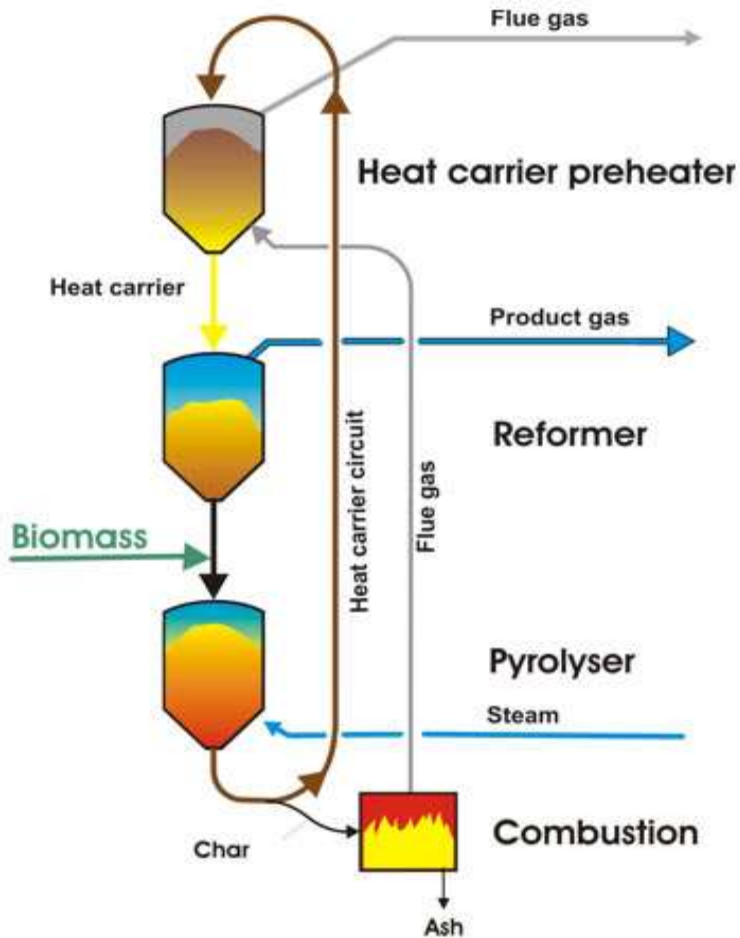
*** Current cost for PMC for transportation of waste @ Rs.550/Ton (-) Transportation charges required for waste dumping to Biogas plant @ Rs.150/Ton = Total savings @ Rs.400/Ton.**

Advantages of Biogas Plants



- **Disposal of waste at local level** Reduction in transportation cost @ Rs. 400 per ton of waste, approximately Rs.1.43 Cr. annually (98 tonnes per day).
- **Valuable Bi-Products** such as Biogas and Manure.
- **Generated Electricity** will be utilized for street lighting.
- **Space requirement** of 5000 sq ft for 5 TPD plant
- **Reduced Greenhouse Gas Emissions** - Stopping release of @ 180 cum of Methane in to the atmosphere per day per plant which is 22 times danger than CO₂ for Global Warming.

MSW TO ENERGY – ROCHEM PLANT



1. MSW Processing plant of capacity 700 TPD
2. Technology: Gasification/Pyrolysis
3. Output: Electricity generation@ 10 MW per day.
4. DBOOT basis
5. Space Requirement: 10000 sq mts
6. Waste disposal in 48 hours
7. Less inert material after treatment
8. Carbon credit system under CDM.

ROCHEM SEPARATION SYSTEM



Shredding



Drying



Pre Conditioning



Gasification

Emissions from Solid waste



Variable	Value
Total MSW generated	496,400 MT/year
% of MSW treated at SWD sites	100%
Methane correction factor*	0.6
Degradable organic carbon	65%
Fraction DOC dissimilated*	0.5
Fraction of CH ₄ in landfill gas*	0.5
Recovered CH ₄	0%
Oxidation factor	0
Calculated CH ₄ emission	10,131 MT/year
Total CO₂ equivalent emissions	212760 MT/year
<i>* These are IPCC default correction factors</i>	

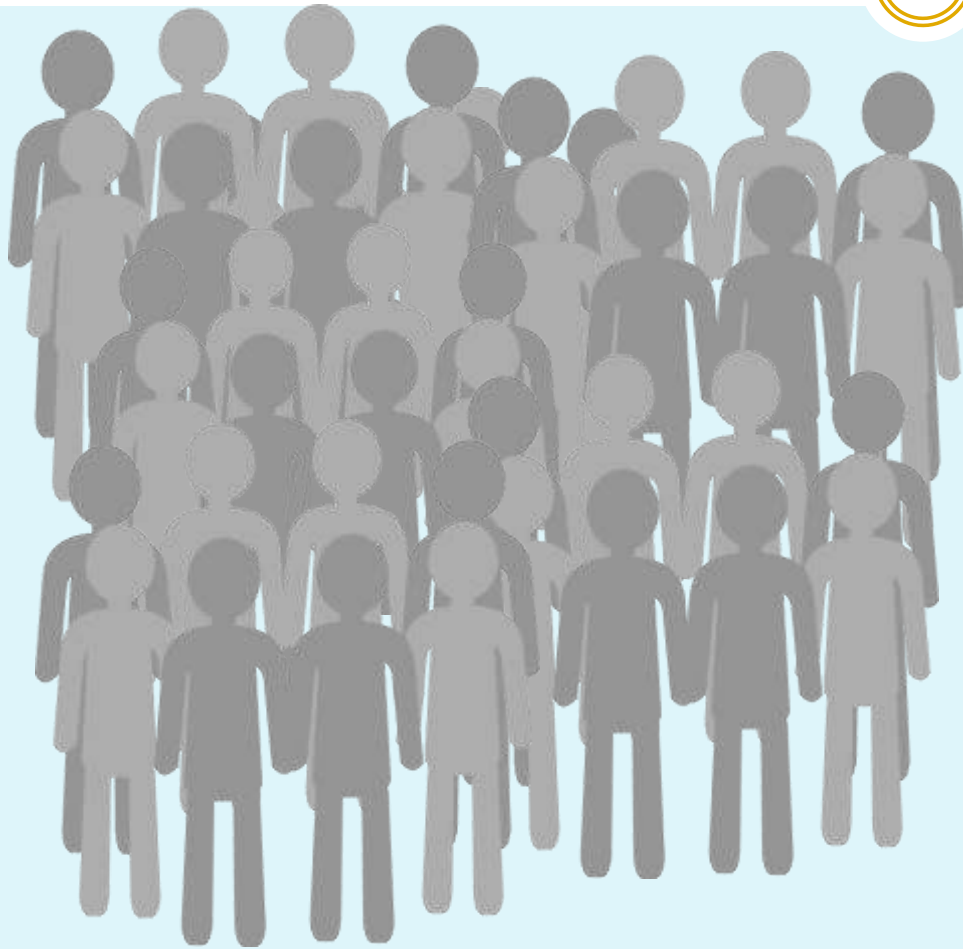
Translates to **0.07 tCO₂e** per capita in 2010-11 from Solid waste

Reducing Carbon Emissions with Eco friendly technologies

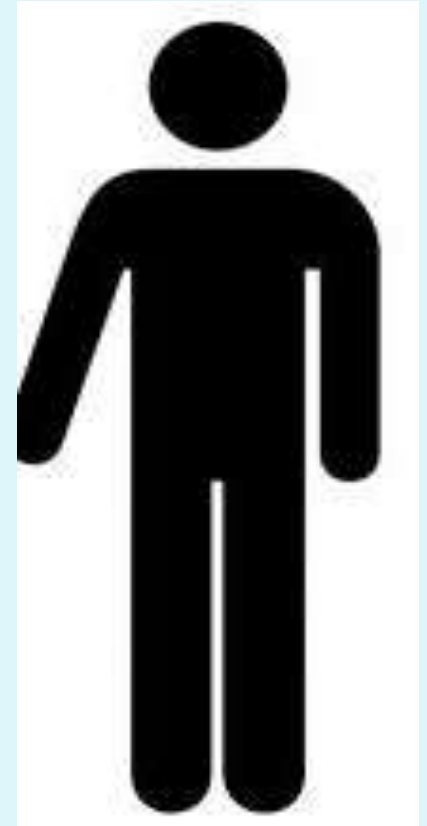


- The total CO₂ equivalent emissions could have been **5.58 times** the current emissions in case PMC had not installed the scientific technologies to process MSW in Pune city

Total emissions of Pune City 2010-11



4.66 Million tCO₂e



1.46 tCO₂e

Potentials in using different technologies



- Combined treatment for sewage and organic waste
- Vehicle fuel generation from biogas
- Compression of Biogas.



ISO Certified System



Media Coverage

THE PUNJABI REFLECTOR

WEDNESDAY 1 OCTOBER 2012

www.punjabireflector.com

Reflect **ii**

Postcards of Change

Clean it like Pune

Pune's range of solutions for managing waste range from the most traditional to the most modern and scientific, and are already resulting in saving money for the municipality—and that's without even accounting for the carbon credits

ISHER JUDGE
AHLUWALLA



Pune, the second largest city in Maharashtra after Mumbai, offers a shining example of what a city can do to manage the growing masses of garbage in its homes at a rapid pace. Nicky knows as the cultural capital of Maharashtra, Pune is also the capital of the cleanliness of its many fine educational institutions, sporting elite sports and students from all over India and abroad. The city has always been an important commercial centre of Maharashtra, not the megametro of Bombay in the Peshwa days, particularly the construction of IT computer parks of international and multinational level, has added a modern flavour to its development.

Growing numbers and rising property has meant that not only is the quantity of solid waste growing—Pune generates 1,400 metric tonnes of solid waste per day—but its composition is also changing with more plastics and non biodegradable elements to reflect the changing patterns of consumption of the metropolitan class.

The Pune Municipal Corporation (PMC) has been trying a range of solutions from the most traditional and formal to the most modern and scientific, in ensuring waste is managed with utmost care and environmental friendliness. The PMC has been trying a range of solutions from the most traditional and formal to the most modern and scientific, in ensuring waste is managed with utmost care and environmental friendliness.

Pune was the first city to offer citizens the benefit of 'waste on demand' services and 'waste on demand' services.

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TIMES NEWS NETWORK

Nearly half of the leftover food is fit to be consumed, as per data from the solid waste management department of the PMC

Karve Road comes third when it comes to the amount of food leftovers generated from eateries with about 11 to 11.5 tonne. The area had around 110 eateries till January 2012. "The biogas plants can convert five metric tonne of waste into electricity. Leftovers not fed to these plants are sent to the vermiculture plant," the official said.

शुक्रवार, १२६ मार्च २०२०

विज्ञान शंभर खोजमिष्ये प्रक्रिया प्रकल्पान्नी खोजना

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Biogas Plant Powers 145 Street Lamps In City

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primarii și subprimarii din județ.

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Hon. Dr. Ishar Ahluwalia's visit to biogas plant



Hon. Shri Mahesh Pathak sharing Pune Biogas experiences with Hon. Dr. Montek Singh Ahluwalia



Hon. Dr. Montek Singh Ahluwalia's visit to biogas plant



Hon. Shri Arun Myra's and Shri Suresh Jagtap at Peshwe Park biogas plant



Conclusion



- PMC has responded to the challenges of urbanization and is making every possible efforts to improve quality of life of its citizens.
- The city has taken multi dimensional approach to overcome the challenges of urbanization.
- The solution lies in using different technologies tailor made to solve the specific needs of the problems at local level.
- Citizen and Governance have come together mutually agreed to execute solutions.
- Pune- An Emerging ECO-Friendly City.



Recognition



- Vasundhara Award 2013 by Maharashtra Pollution Control Board for best practices
- Vasundhara film Award 2013 for - Awareness film '*Kachara Muktnichya Dishene*'
- HUDCO Awards for Best Practices to “ Improve the liv 2012-13”
- ICON SWM 2012- Award of Excellence in SWM.
 - By International Society of waste management, University & Karnataka Govt,2011-12.
- NagarRatna Award by JNNURM in 2010-2011.



Jadhavpur



Thank You for patient listening...



Pune Municipal Corporation, Maharashtra