

# **Waste Management: Policies, Issues, Challenges and Way Forward**

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**July 12, 2016**

Centre for Science and Environment, New Delhi

# Mixed Solid Waste, nowhere to go



# Inappropriate Waste Management





# Poisoning Landfills

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**TIMES CIT**

THE TIMES OF INDIA, NEW DELHI, WEDNESDAY, SEPTEMBER 9, 2014

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## Landfill in Fbd hills will make NCR aquifers toxic

Leachate From Defunct Waste Plant Creates Polluted Lake

Jayashree Handi  
@timesgroup.com

**New Delhi:** The Haryana government may end up destroying the water recharge zone for Delhi, Gurgaon and Faridabad if it goes ahead with its plan of landfilling quarry pits near Pall village in Faridabad Aravalli. Scientists and geologists TOI spoke to said the Aravallis and the Yamuna floodplains are absolutely sacrosanct for drinking water availability in a large part of NCR.

Meanwhile, damage of groundwater aquifers in the region has already begun with leachate from the defunct Bandhwar waste treatment plant nearby forming a huge toxic lake in the midst of the forest.

The government, however, has not even bothered to send leachate samples for tests. The Bandhwar plant stopped treating waste two years ago, reportedly after a fire on the premises. But villagers claim that the plant never processed the entire waste that would land there, leading to leachate seepage that gradually flowed into the hills. They also say that waste from Gurgaon is also dumped in the precincts

### POISON IN WATER

**SOUTH DELHI'S GROUNDWATER IS SUFFERING FROM LEACHATE POLLUTION**

**WHAT IS LEACHATE?** It's a solution resulting from leaching, as of soluble constituents from soil, landfill, etc., by downward percolating ground water. Leaching is loss or extraction of certain materials from a carrier into a liquid.

Municipal solid waste (management) rules 1999 state that the landfill site shall be away from habitation clusters, forest, water bodies, national parks, wetlands and places of cultural, historical or religious interest.

#### Why is it dangerous?

- A JNU team studied raw leachate samples collected from Bhalswa, Chazipur and Okhla landfills
- Samples were found to have relatively low concentrations of heavy metals
- The organic component was 158 times the upper permissible limit
- Xenobiotics, aromatic compounds, polycyclic aromatic hydrocarbons, phthalate esters and other contaminants were present
- There was a significant load of cytotoxic compounds which cause DNA damage

of the plant.

The Haryana government seems to have violated several provisions of the 1999 municipal solid waste rules. It did not construct a non-permeable lining system at the base and walls of the waste disposal area; nor did it make provisions for leachate collection or treatment, stipulated in schedule 4 of the rules. The new draft sol-

id waste management rules, too, warn against locating landfills on hills.

Pointing at the leachate lake, villager and activist Sunil Hansana said, "This used to be a village *Jobad* (water body) years ago. The leachate has already contaminated the groundwater. Some houses across the border in Delhi are receiving foul-smelling water."

Sunil Hansana



Leachate from defunct waste treatment plant at Manesar in Faridabad

## DU student arrested for extortion bid

TIMES NEWS NETWORK

**New Delhi:** A Delhi University student has been arrested for trying to extort Rs 50,000 from a businessman in south Delhi.

Police officers said 21-year-old Vipin Shukla had so threatened to kill the businessman's children. It had to pay up.

Shukla kept changing location to evade arrest. He was nabbed from east Delhi's Tis Hazari area on Tuesday morning, police said. His mobile phone and a laptop used in the crime have been seized from the accused DCP special cell (MAA) Kalyan.

During interrogation, DC's student told police he was from Uttar Pradesh and came to the city in 2010. He told police he was a businessman at a tea stall. Shukla's father, who works as a private businessman, is a member of the management of the temple.

According to police, a SIM card used by Shukla to make the extortion bid was bought using a fake name. Police said that he changed his location to avoid being caught. However, the police caught him when he was in his family.

Shukla was in a case has been registered in Anand Vihar police station.

## EWS seats charges being

TIMES NEWS

**New Delhi:** EWS scheme charges are being raised in the EWS scheme.

In the current EWS scheme, the charges are being raised in the EWS scheme.



# Structure of the Presentation

Presentation is divided in Four Sections

- Comprehensive review of current municipal solid waste management (MSWM) in India including issues and key challenges faced by urban local bodies (ULBs)
- Gaps in the SWM implementation and cost analysis of SWM by municipalities
- Best practices and Recommendations
- A good tender contract

# Current Scenario of Municipal Solid Waste Management in India

**Waste generation** 1,43,449 TPD during 2014-15 (as per CPCB report)  
1,70,000 TPD (62 million tons annually)  
(as per Task Force on Waste to Energy,  
Planning Commission, 2014, New Delhi)

**Average waste generation** 0.11 kg/capita/day (GIZ, 2015)

**Per capita waste generation** 200-300 gms/capita for small towns  
300-400 gms/capita for medium cities  
400-600 gms/capita for larger cities  
(as per Planning Commission, 2014, New Delhi)

**Waste collection** 68 percent of the waste generation (MoUD, 2011)  
70-90 percent in larger cities  
less than 50 percent in smaller cities.

**Waste disposal** More than 80 percent of MSW is disposed at open dump sites  
without any treatment (Planning Commission, 2014, New Delhi)



## Issues and Key Challenges of Municipal Solid Waste Management

- Increasing waste generation and irresponsible waste behaviour puts immense pressure on ULBs.
- Most ULBs are unable to handle huge quantities of solid waste due to financial and institutional debilities.
- Waste management technologies follow wrong priorities
- Collection efficiency is around 50-60 percent and 90 in few ULBs especially Class I A cities

## Issues and Challenges contd...

- 100 percent collection is still a big challenge for ULBs.
- There is no system of periodically collecting data on waste generation.
- Only 10 percent of the collected waste receives treatment and virtually nothing is scientifically disposed in engineered landfills.

▣ **Contd....**



## Issues and Challenges contd...

- Limited land for waste disposal especially in large cities.
- ULBs rarely have sufficient funds, resources, infrastructure and appropriate strategies.
- Segregation of waste at the door step is almost absent.

- Mixing of wet and dry waste along with household e-waste, toxic waste and bio-medical waste.
- Vehicle break-down, foul smell and spillage due to improper collection/ transportation.
- Inefficient monitoring of routes and operators are other issues that need to be addressed.
- More than 80 percent waste is disposed indiscriminately at dump yards in an unhygienic manner by municipal authorities.
- Finding new landfill sites is a major constraint especially because of the 'not in my backyard' (NIMBY) phenomenon.



# Essential Municipal Functions

as per 12<sup>th</sup> schedule, 74<sup>th</sup> amendment to Constitution of India

Essentially Municipal Functions	<u>Municipal Corporation</u>	<u>Municipal Council</u>	<u>Nagar Panchayat</u>
Urban planning including town planning	Yes	Yes	Yes
Regulation of land-use and construction of buildings	Yes	Yes	Yes
Planning for economic and social development	Yes	Yes	Yes
Roads and bridges	Yes	Yes	Yes
Water supply domestic, Industrial and commercial purposes	Yes	Yes	Yes
Public health, sanitation, conservancy and solid waste management	Yes	Yes	Yes
Fire services	Yes	Yes	No
Urban forestry	Yes	Yes	Yes
Preventive Health Care	Yes	Yes	Yes
Provision of urban amenities and facilities such as parks, gardens, playgrounds	Yes	Yes	Yes
Burials and burial grounds, cremations, cremation ghats/grounds and electric crematoria	Yes	Yes	Yes

# Municipal Functions contd...

Cattle pounds, prevention of cruelty to animals	Yes	Yes	Yes
Vital statistics including registration of births and deaths	Yes	Yes	Yes
	Yes		
Street lighting		Yes	
	no		
Parking lots, bus stops and public conveniences	Yes	Yes	Yes
Regulation of slaughter houses and tanneries	Yes	Yes	Yes
Slum improvement and up gradation	Yes	Yes	Yes
<b>Agency Functions</b>			
Protection of the environment and promotion of ecological aspects	Yes	Yes	Yes
Safeguarding the interests of weaker sections of society, including the handicapped and the mentally retarded	Yes	Yes	Yes
Urban poverty alleviation	Yes	Yes	Yes
Promotion of cultural, education and aesthetic aspects	Yes	Yes	Yes
Primary Education	Yes	Yes	yes
Primary Health Care	Yes	Yes	
		yes	



# Municipal Revenue

## ▣ Own Taxes

- Property tax
- Professional tax
- Advertisement
- Octroi
- Entry tax

## Own Non-taxes

- User Charges
- Fees and Fines
- Interest income
- Sale of Property

# Municipal Revenue contd...

- ▣ Intergovernmental Transfers and Grants
  - Central government – Finance Commissions
  - State Finance Commissions
  - Borrowings and Municipal Bonds
  - Bank Borrowings
  - Stamp Duty sharing

# NIUA 2000 report on services

A study of 300 class I cities and all State and UT capitals

- ▣ Average expenditure on Solid Waste Management as part of Total Revenue Expenditure of a Municipality/ Municipal Corporation was 15-20%
- ▣ About 75% of this expenditure was on Establishment and Salaries and about 20% on Transportation, rest being on other O&M costs
- ▣ All ULBs experienced financial crunch and hence the quality of services suffered

# Cost of SWM in 2014-15

- ▣ Establishment and Salaries/ Wages 65%
- ▣ Operation and Maintenance 35%
  - Transportation 20%
  - Other O&M including consumables 10%
  - Contingency 5%



# Expenditure on Solid Waste Management

City	Year	Population	Actual SWM expenditure	Total Revenue Expenditure	Percentage
Pune (Class I A)	2014-15	31.24 lakhs (Census 2011)	Rs.203.125 Cr	Rs. 3125 Cr	6.5%
Hospet (Class I C)	2014-15	2.06 lakhs (Census 2011)	Rs. 2.3 Cr	Rs. 20 Cr	11.5%
Bangalore	1997-98	50.1 lakhs	Rs.42.24 Cr	Rs.528 Cr	8%
Rajkot	2008-09				23%
GVMC (Vizag)	2008-09				25%

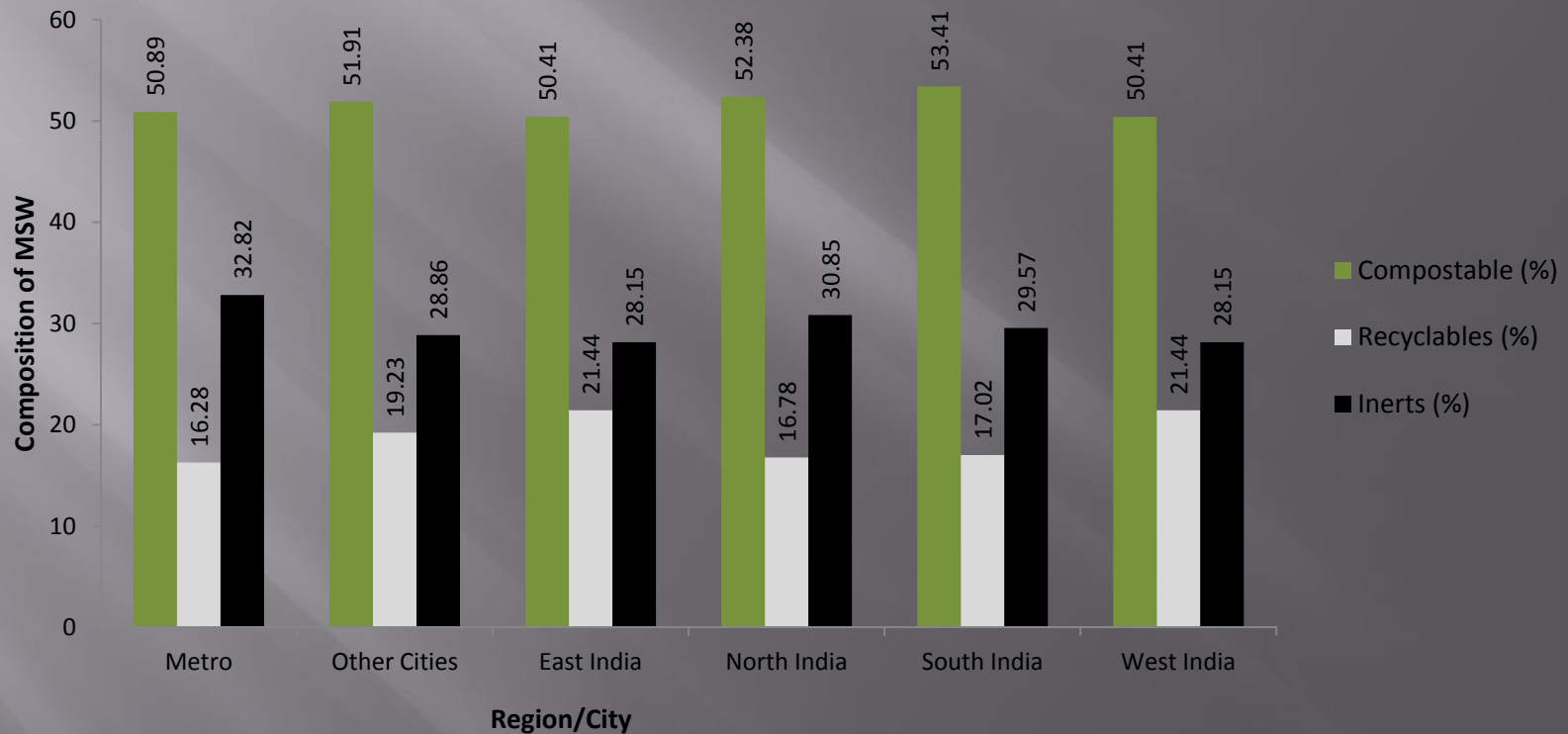
## Urban Agglomerations/Towns by Class/Category : Census of India 2011

As per 2011 census, number of towns 7935, with 468  
Class I cities of which 53 are 1,000,000 plus cities

Class	Population Size	No.of UAs/Towns
Class I	1,00,000 and above	393
Class II	50,000 - 99,999	401
Class III	20,000 - 49,999	1,151
Class IV	10,000 - 19,999	1,344
Class V	5,000 - 9,999	888
Class VI	Less than 5,000	191
Unclassified		10*
All classes		4378

# Composition of Municipal Solid Waste (MSW)

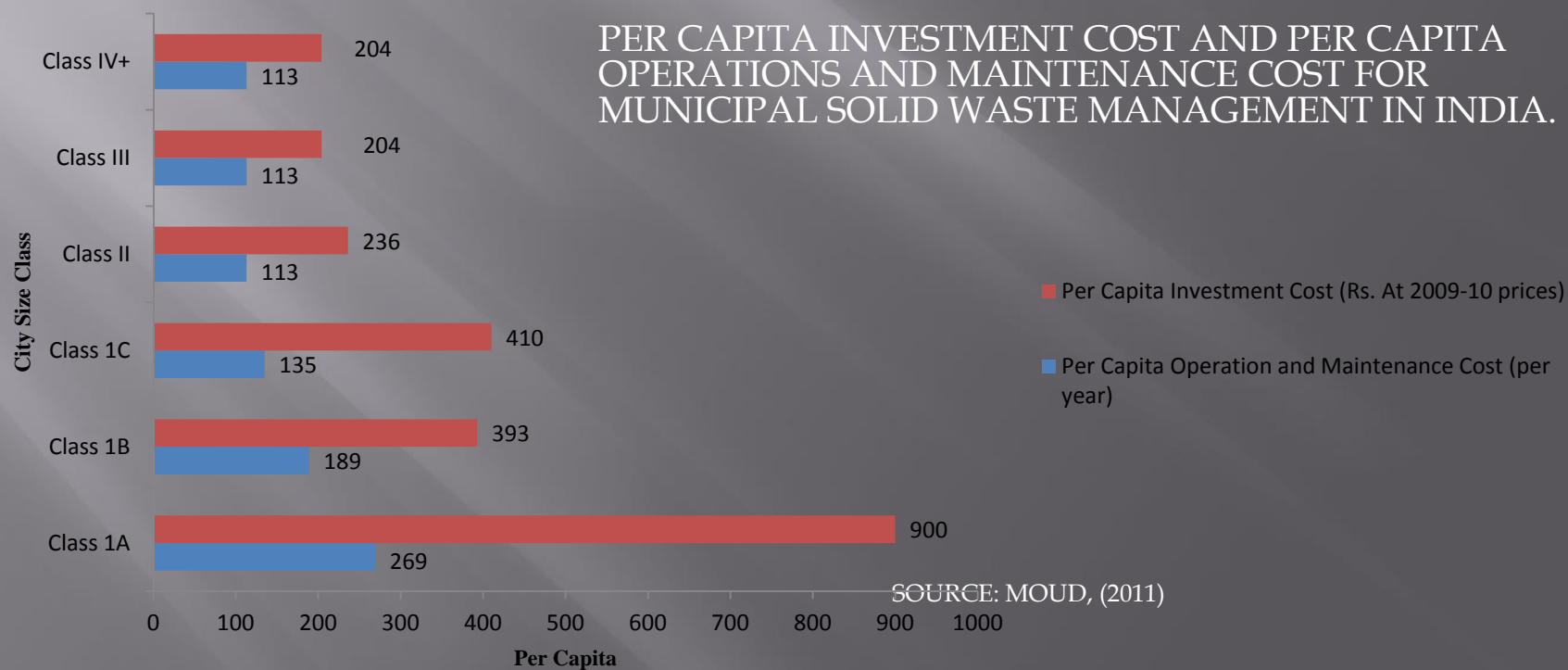
Composition of MSW in India & Regional Variation



□ Source: Earth Engineering Centre, 2012

# Devolution of 12<sup>th</sup> Finance Commission Grants for SWM

Sl. No.	Particular	Amount (₹ in Crore)
1.	Collection & Transportation equipment & Machinery	386.44
2.	Compost Plants	1001.23
3.	Sanitary Landfill Development	1056.88
	Total	2444.55

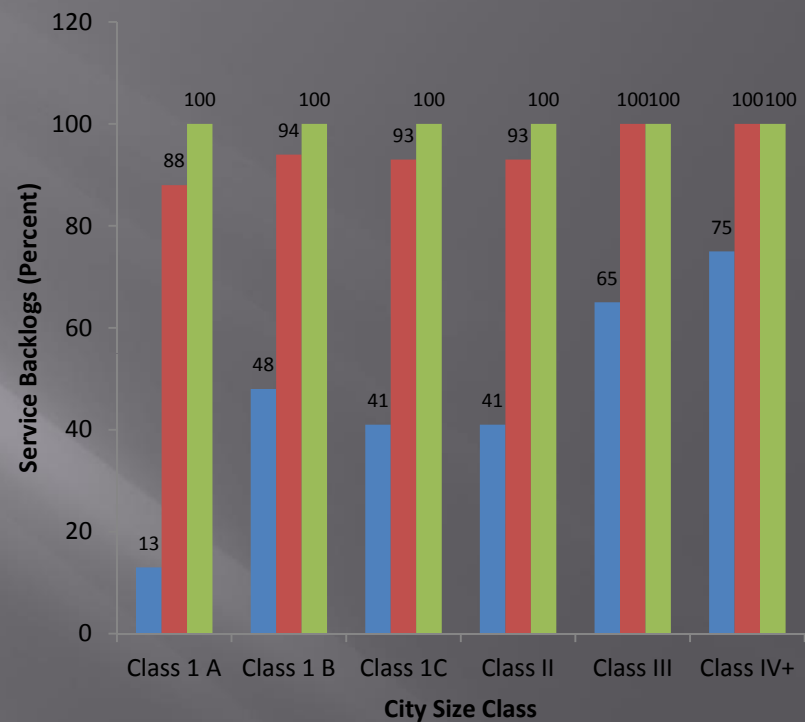




# Backlogs of Service Level Benchmarks

Sl.No	Performance Indicator	Service Level Benchmark (in percent)	Current Average Performance ( in percent)
1.	Complaint Redressal	80	89.1
2.	Collection Efficiency	100	75.3
3.	Household Coverage	100	47.7
4.	MSW Recovery	100	31.7
5.	User Charges Collection Efficiency	90	31.4
6.	MSW Segregation	100	19.5
7.	Scientific Disposal	100	8.0
8.	Cost Recovery	100	17.3

□ Source: Karthykeyan, Aziz, Chatri, and Shah (2012)

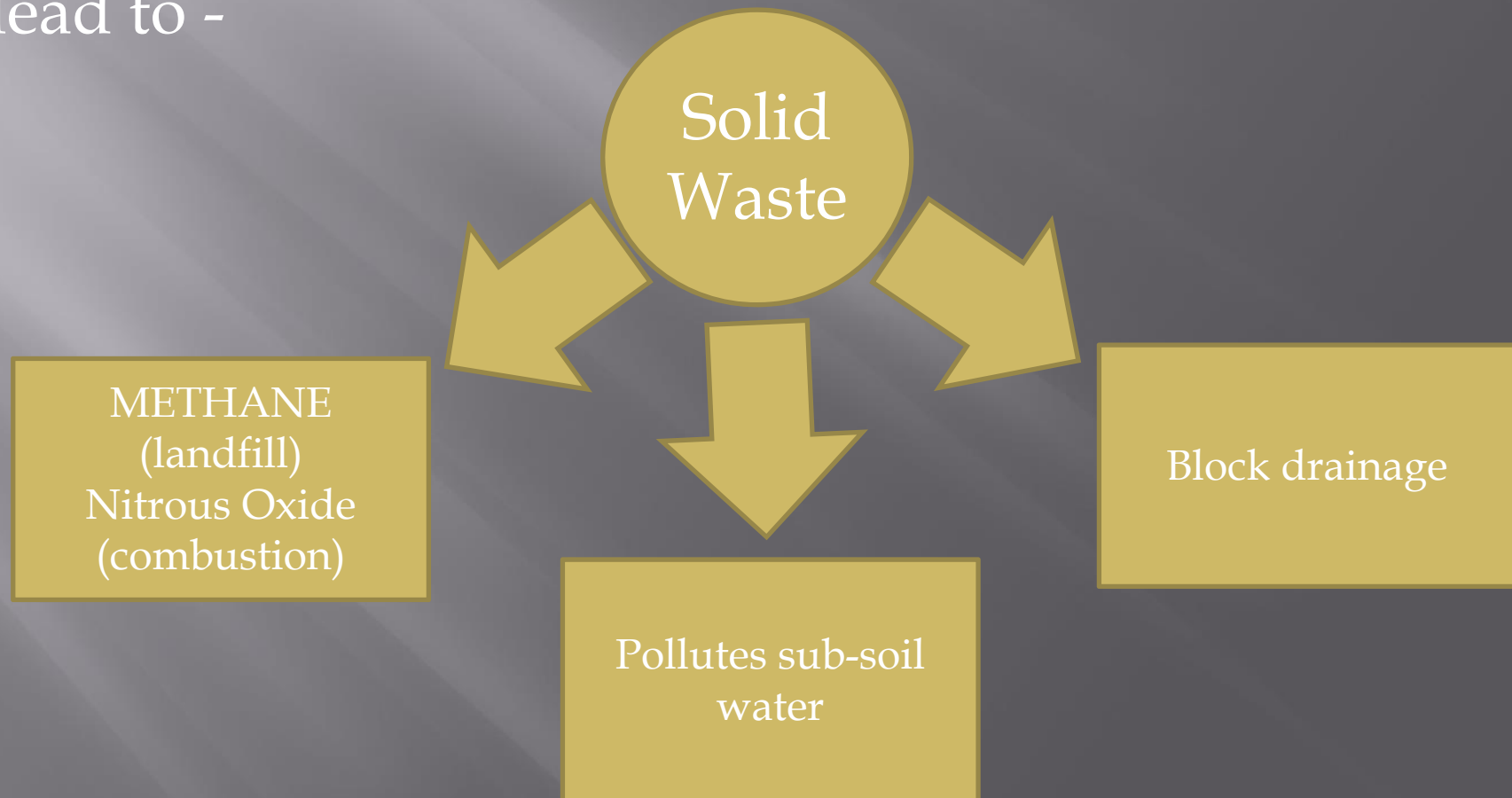


■ Collection and Transportation ■ Processing ■ Scientific Disposal

Source: MoUD, (2011)

# Impact of Solid Waste – dumped on roadside or in an open dumpsite

Municipal solid waste if not disposed properly can lead to -



# Generation and Collection

- ▣ There are 53 cities in India with a million plus population, which together generate 86,000 TPD (31.5 million tons per year) of MSW at a per capita waste generation rate of 500 grams/day. The total MSW generated in urban India is estimated to be 68.8 million tons per year (TPY) or 188,500 tons per day (TPD) of MSW.
- ▣ Big cities collect about 70 - 90% of MSW generated, whereas smaller cities and towns collect less than 50% of waste generated. More than 91% of the MSW collected formally is landfilled on open lands and dumps.

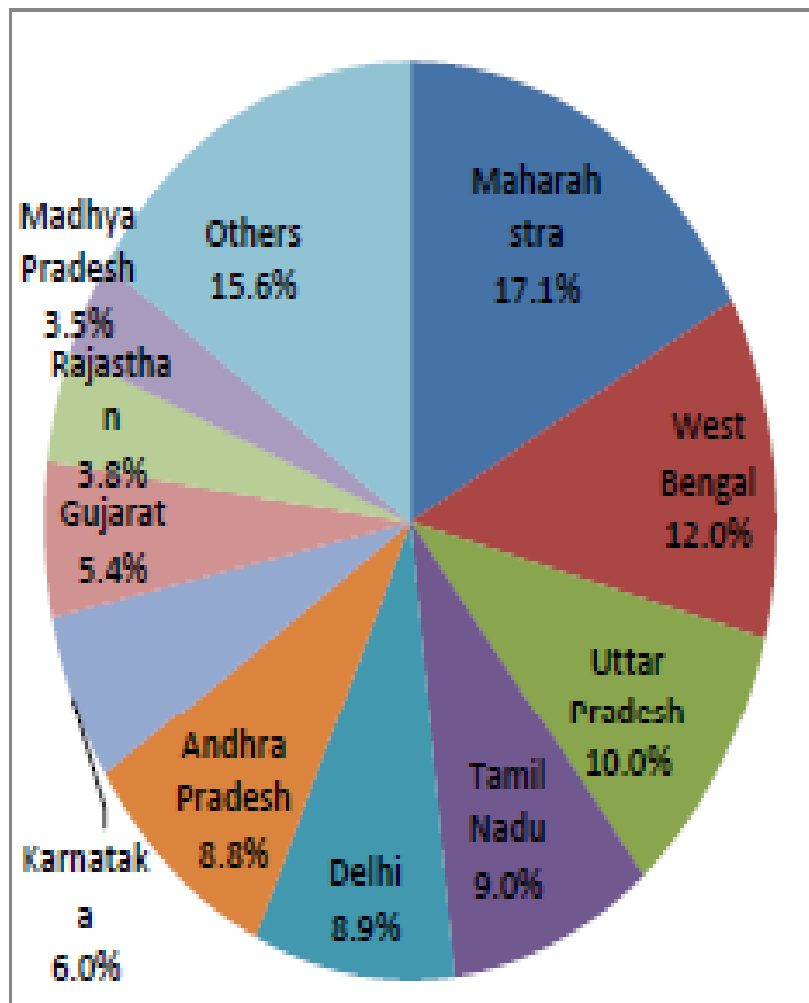


Figure 5, Share of States and Union Territories in Urban MSW Generated

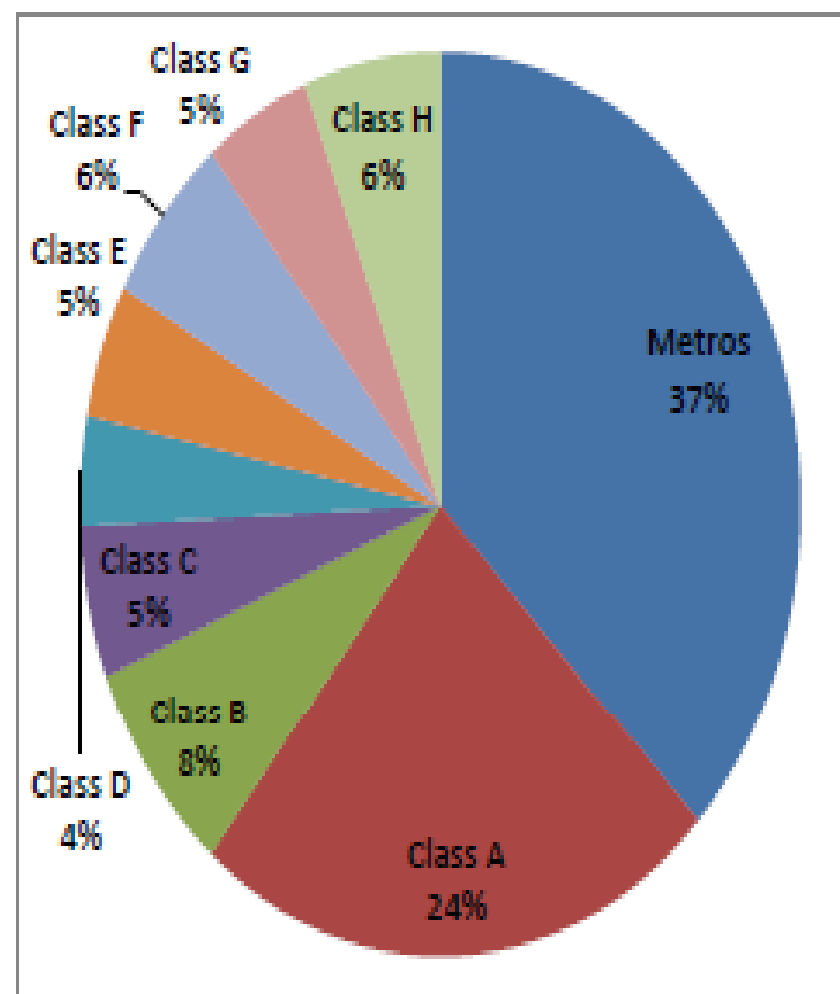


Figure 6, Share of Different Classes of Cities in Urban MSW Generated



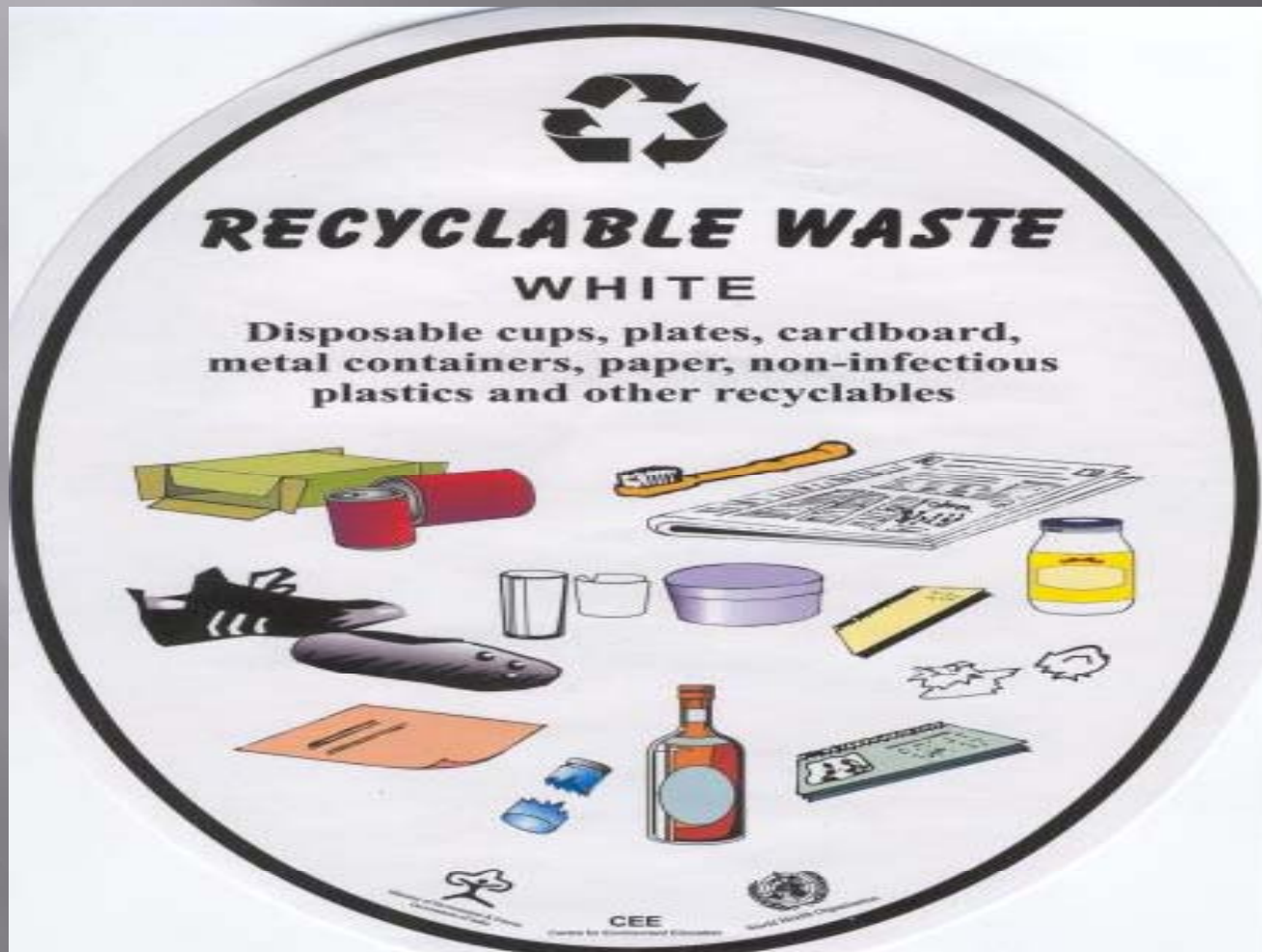
## Quality and quantity of waste per One lakh population

- ▣ WASTE FROM HOUSEHOLDS: 44.25 TONS
- ▣ WASTE FROM MARKETS : 4.0 TONS
- ▣ SLAUGHTER HOUSE : 0.5 TONS
- ▣ RAILWAY QUARTERS  
& STATION : 0.3 TONS
- ▣ BUS STAND : 0.2 TONS
- ▣ RESTAURANTS : 1.5 TONS
- ▣ HOSPITALS : 0.5 TONS
- ▣ OPEN DRAINAGE : 0.3 TONS
- ▣ COMMERCIAL & ROAD : 0.45 TONS

# WET WASTE



# DRY WASTE



# HAZARDOUS WASTE



# Waste or Resource?

- ▣ Of this waste, 70 per cent is wet waste and therefore 7 tons per day is generated which can be composted and almost 42 tons of compost obtained every month.
- ▣ Furthermore, about 2.5 to 3 tons of dry waste can be sold or converted into useful products every day. Both these together can earn upto Rs.1,50,000 per month for the ULB, i.e. Rs.18,00,000 annually!

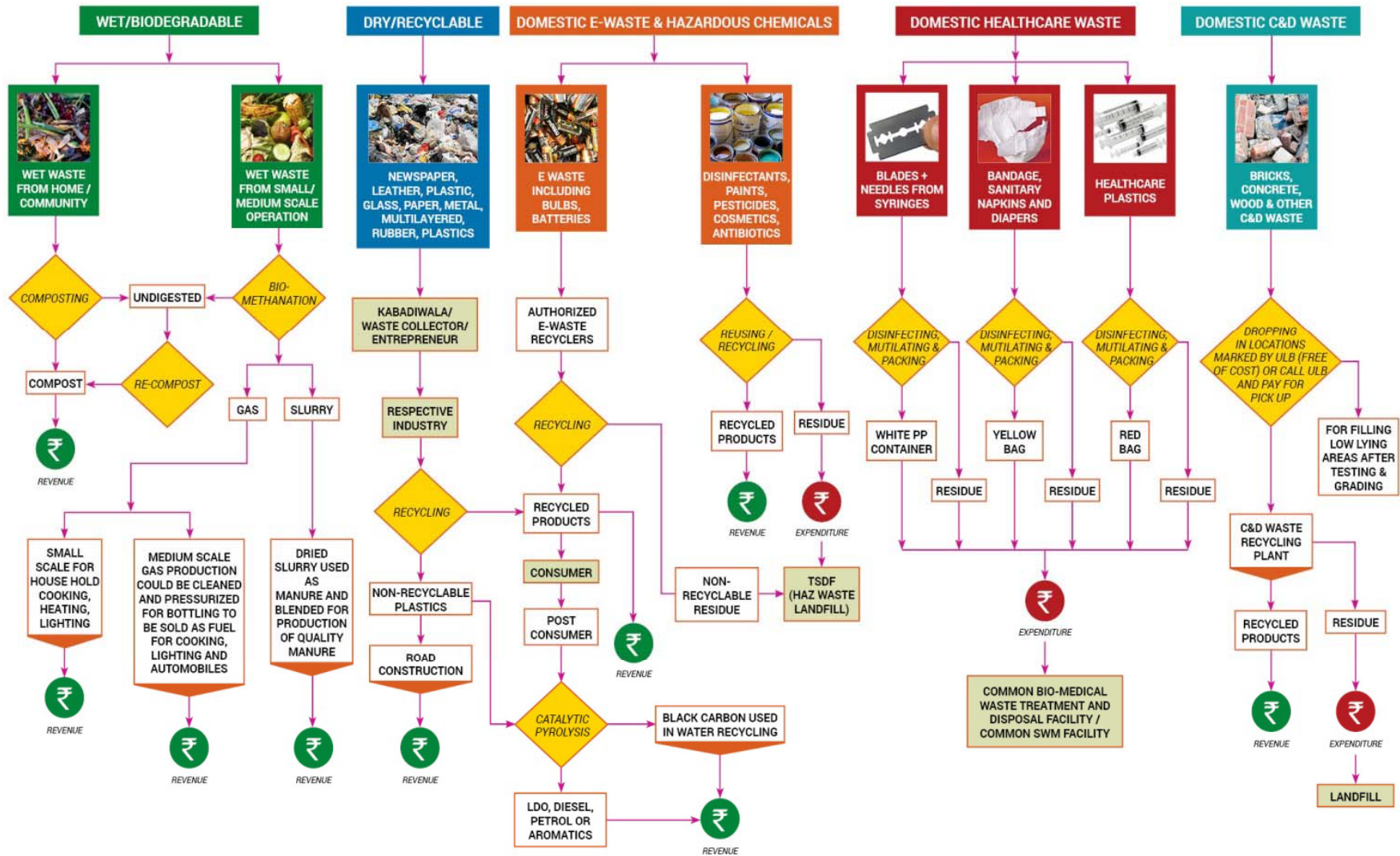


# Solid Waste Management Rules 2016

## Definitions

- **“waste hierarchy”** means the priority order in which the solid waste is to should be managed by giving
  - emphasis to prevention, reduction, reuse, recycling, recovery and disposal,
  - with prevention being the most preferred option and the disposal at the landfill being the least

# HOUSEHOLD WASTE (SEGREGATE AT SOURCE)



Wet Waste (Daily Collection)	Rejects (Red Bucket) (BBMP)	Recyclable Dry Waste (ITC/RECYCLER)		Electronic Waste (Saahas)	
	<p><b><u>SANITARY WASTE</u></b> (To be suitably wrapped in paper and marked "X")</p> <ul style="list-style-type: none"><li>• Sanitary pads,</li><li>• Disposable diapers</li><li>• Menstrual cloths</li><li>• Bandages</li><li>• Ear buds, Hair</li><li>• Used Cotton</li><li>• Any material contaminated with blood and the like.</li></ul>				
<p>• Veg &amp; Fruit Peels</p> <p>• Tea Leaves</p> <p>• Egg Shells</p> <p>• Leftover Food (Veg &amp; Non Veg)</p> <p>• Coffee Powder</p> <p>• Dry Flowers, Seeds</p> <p>• Small Quantity of dry leaves</p>	<ul style="list-style-type: none"><li>• Household dust, sweepings</li><li>• Coconut shells</li><li>• Tender coconut</li><li>• Old Brooms</li><li>• Sponge &amp; Dusters</li><li>• Crayons</li><li>• Wood, Furniture</li><li>• Rubber, Cloth</li><li>• Rexin</li><li>• Discarded Footwear</li><li>• Leather, Thermocol</li></ul>	<ul style="list-style-type: none"><li>• Pizza and Food Boxes</li><li>• Junk Mail, Tickets</li><li>• Pamphlets, Bills</li><li>• Rinsed Paper Cups and Plates</li><li>• Empty Cartons</li><li>• Cardboards, Bubble wrap</li><li>• Computer Printouts</li><li>• Empty Paper Packets</li><li>• Paper Gift Wrapping</li><li>• Broken Plastic Toys</li><li>• Empty Plastic Medicine Bottles</li><li>• Cartons ( used for Packaging )</li><li>• Metal</li></ul>	<ul style="list-style-type: none"><li>• Washed Milk Covers</li><li>• Plastic Bags, Gift Wraps</li><li>• Chips and Toffee Wrappers</li><li>• Plastic Bottles (Shampoo, Floor Cleaners, Toothpaste etc.)</li><li>• Rinsed Plastic Plates &amp; Cups</li><li>• Empty Tetra pack Containers</li><li>• Aluminum Foil</li><li>• Empty Metal Spray Cans</li><li>• Shaving Brushes</li><li>• Metal Bottle Caps</li><li>• Broken Household Metal</li></ul>	<ul style="list-style-type: none"><li>• <b>Batteries &amp; Wires, button cells</b></li><li>• <b>CFL bulbs, Expired cards with chips</b></li><li>• <b>CD/ DVD/ Floppy &amp; Tapes</b></li><li>• <b>Broken Electronic Toys</b></li><li>• <b>Bulbs &amp; Tube lights</b></li><li>• <b>Chargers &amp; Adapters</b></li><li>• <b>Printer Cartridges</b></li><li>• <b>Computer and mobile parts</b></li><li>• <b>Other household electronic Items</b></li></ul>	
		<p><b>Recyclable Dry Waste</b> (ITC/RECYCLER) (Glass Bottles &amp; Tin Cans)</p>			
		<p>• Unbroken Emptied Bottles (Beer, sauce &amp; jam bottles, medicine bottles, glass jars etc.)</p> <p>• Emptied Tin Cans (coke, beer etc.)</p> <p>• Emptied Tinned food cans</p>			
<p><b>Disposal: In closed marked bins, to be kept at DOORSTEP ONLY</b> <b>Pickup: Daily</b></p>	<p><b>Disposal: In closed marked bins, to be kept at DOORSTEP ONLY</b> <b>Pickup: Daily</b></p>	<p><b>Pickup: Weekly Once</b> <b>On Saturday by 12 noon</b></p>		<p><b>Household Hazardous Waste (HHW)</b> (TRD)</p> <ul style="list-style-type: none"><li>• Cleaning agents, Mosquito Repellants mats, spray cans</li><li>• Paints</li><li>• Oils (other than cooking oil)</li><li>• Solvents &amp; their containers</li><li>• Discarded Medicines/ Syringes/Thermometers</li><li>• <u>Chemical Cosmetics</u></li><li>• <u>Razors</u></li><li>• Insecticides &amp; their containers</li><li>• Unused/ Expired Metal Spray Cans</li><li>• Air Fresheners</li></ul>	
<p><b>Disposal: Individuals to dispose in designated bins</b></p>					
<p><b>Raheja Residency Apartments, Koramangala 3rd</b></p>					

# Recyclables (ITC)

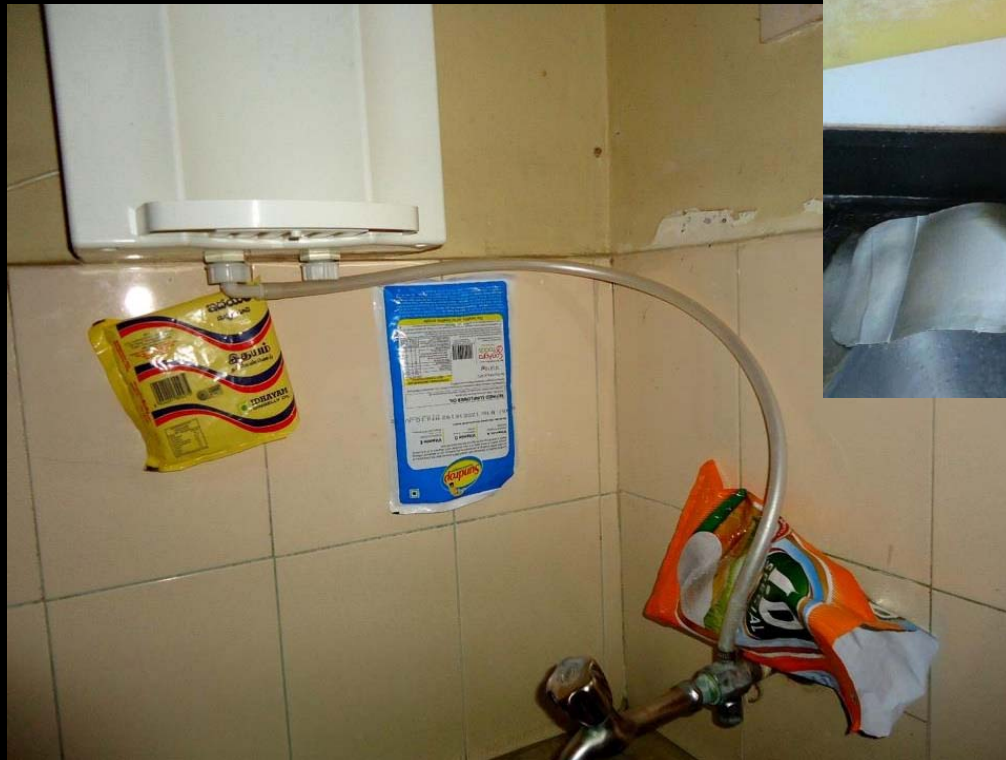


- ✓ Program initiated in Aug '11
- ✓ All 8 blocks on board in May '12
- ✓ Weekly collection every Saturday



# Plastic/Metal/Glass/Paper

- ✓ washed and dried
- ✓ free of food residue



# Wet waste



Source: telegraph.co.uk

# No Plastic Lining



Saving 2,91,200 plastic bags/year



# Smell ?



# Wet waste treatment

**Composter for fifty households**



**Household biogas**



# Rejects (red bucket)



- ✓ House sweepings, hair
  - ✓ Pet droppings, wrapped in newspaper
  - ✓ Sanitary pads, diapers, etc \* – wrapped in newspaper and marked with a red X
  - ✓ Dry coconut shells
- 

- ✓ Bin lined with newspaper only
- ✓ Collected daily (if needed)

\* Sanitary waste includes any tissues/cloth soiled with body fluids

# Hazardous + E-waste

- ✓ Tubelights and bulbs
- ✓ Batteries
- ✓ Cleaning agents
- ✓ Paints
- ✓ Oils (non-cooking)
- ✓ Aerosol cans
- ✓ Cosmetics
- ✓ Insecticides
- ✓ Medicines
- ✓ Syringes
- ✓ Thermometers
- ✓ CDs/DVDs
- ✓ Cassettes
- ✓ E-waste (computer and mobile parts)



- ✓ Common bin placed in each block lobby
- ✓ Collection/Disposal - TBD

# Other types of dry waste

Material	Classification? Recyclable?
Thermocol	<u>NOT</u> recyclable. Minimize usage, do not buy thermocol plates. Return thermocol in packing material to the store after delivery (frig, washing machine etc)
Broken pots	Rejects or Debris
Pet litter	Sanitary waste. To be disposed of in a newspaper bag marked with a red X
Cloth, waste fabric	Goonj ( <a href="http://goonj.org/">http://goonj.org/</a> ) will accept all kinds of torn/waste cloth and fabric. Organize a collection drive.
Broken brooms and mops	If plastic, throw with ITC recyclables. If wooden, throw with red bucket.
Soiled plastic (chutney / sambar packets)	Please avoid usage! The flimsy plastic used is not food grade, and is BAD for health, especially if hot liquids poured in it. Take your own dabba for darshini carryout 😊 If used, rinse and dry, and put in ITC bag, or if not possible to clean, throw as rejects.



# Home Composting



# Sustainable practices



The Solution for 100% segregation at the source - 2 Bins and A Bag  
 A one time expense of less than Rs.100 per household will keep your city clean  
 No Plastic Garbage Bags - additional savings per household  
 Follow this simple standardised colour coded waste segregation process



A public interest initiative by HSR Citizen Forum and Kasa Muktha Bellandur





# Solid Waste Management Composting

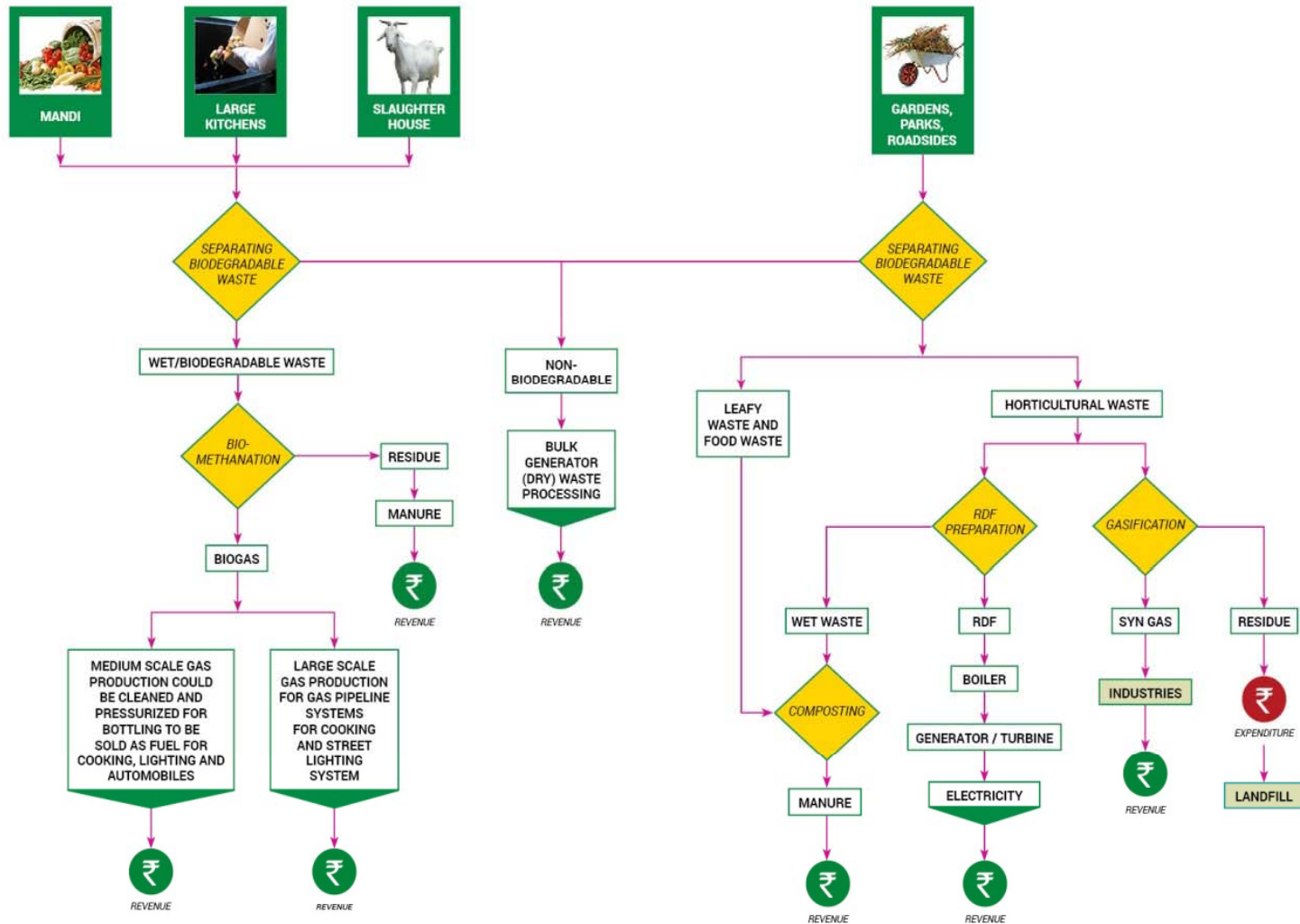
**Door to door collection**



**SWM Composting site at Kalyan Nagar, Bengaluru**



## BULK GENERATOR (WET) – SEGREGATE AT SOURCE

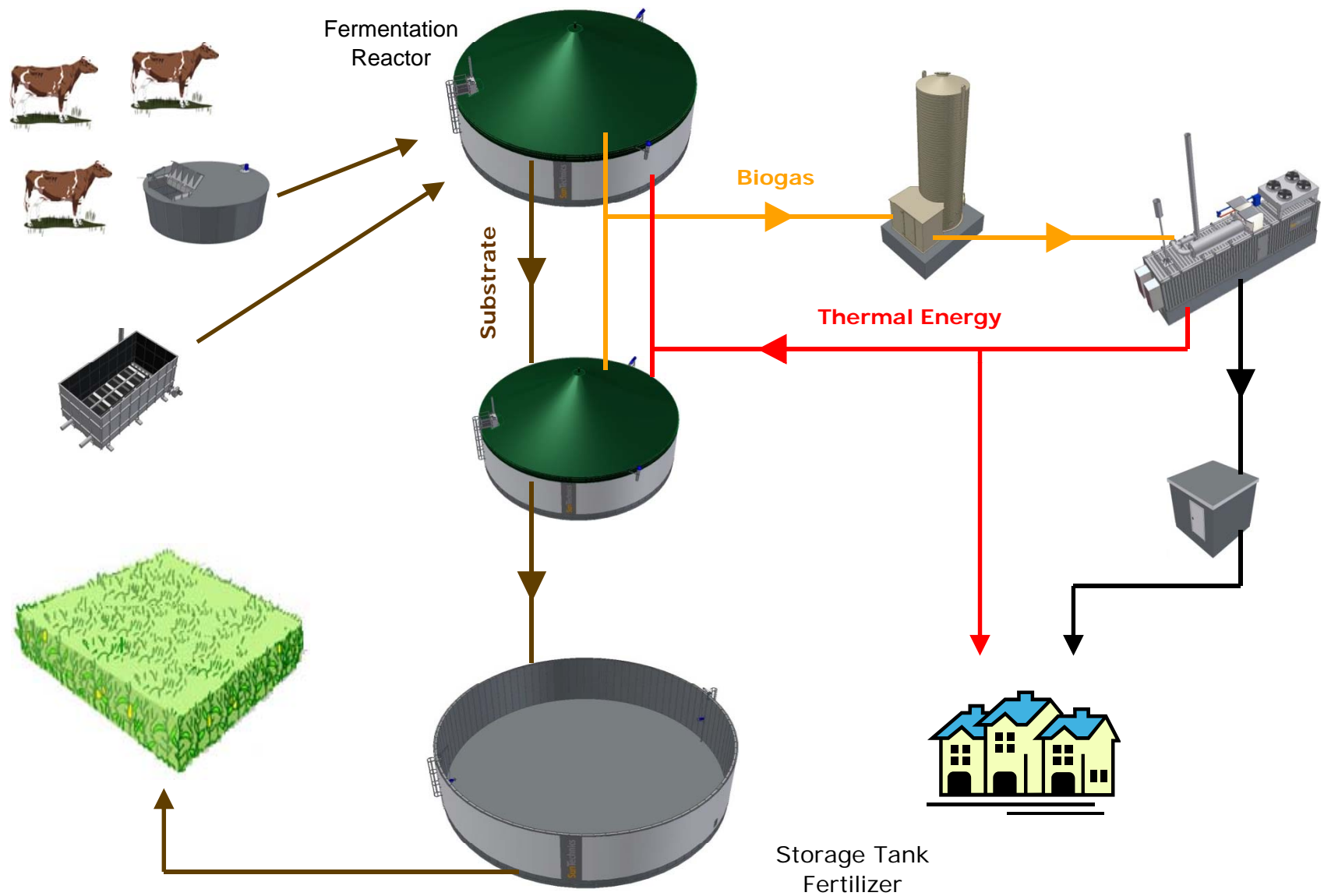




# Market waste - plenty



# Material Flow Chart



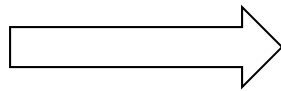


# Plant Types



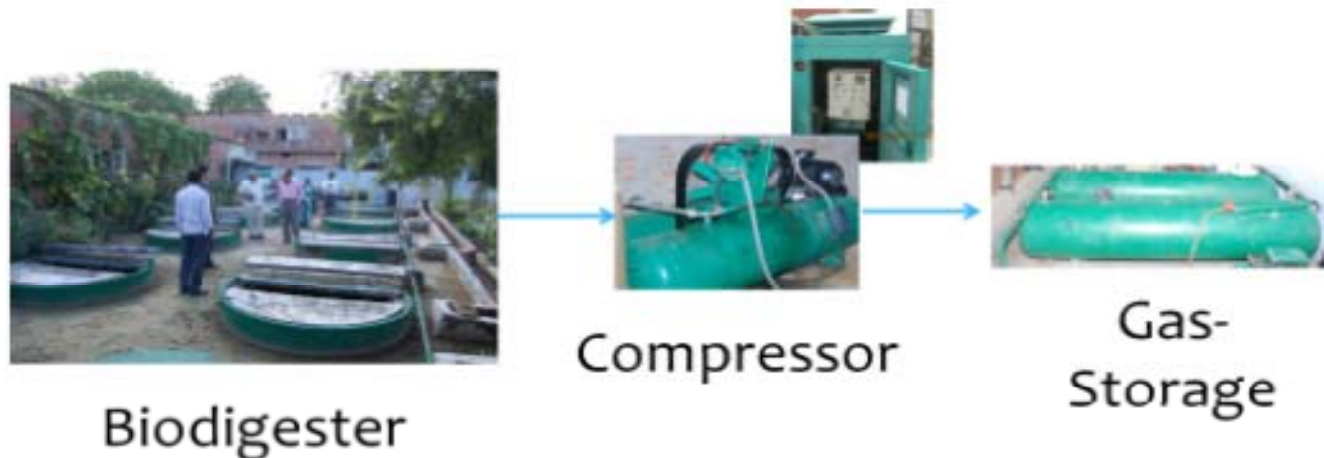
← FLOATING DOME TYPE

PLUG FLOW TYPE



# Community level Biomethanation

Organic Waste to Energy



## Salient Features

- Community level
- Converts biomass to methane for combustion
- Accepts dry and wet biomass (need 20% cow dung)
- Already implemented in field

# Biomethanation for hotels and canteens

**TEAM technology at Sona**



**TEAM technology at Faridabad**





# Bio-methanation for market waste



# Bangalore 2015

## Biogas stored for conversion to electricity

## Biogas for cooking and Electricity for Streetlighting



# Bioconversion Process

## Aerobic Composting



The segregated wet wastes from zones 1, 2 & 3 is brought to the composting site. It is composted in the heap method through a process called Aerobic Composting.

- The heap of waste is turned for aeration once in four days. This helps to regulate the moisture and temperature and hastens the process of organic composting.



# Collection of source separated waste and composting of household waste





# Peri-urban farming



# Centralised Composting facility

**Segregated Transportation**



**Sieving and grading**





# Centralised Composting

**Aerobic Composting**



**Compost as per FCO**



# SOLID WASTE MANAGEMENT PLANT, NEW MOTI BAGH (WASTE PROCESSING UNIT)





# SOLID WASTE MANAGEMENT PLANT (COMPOST MACHINE OWC FOR HOUSEHOLD WASTE)



# SOLID WASTE MANAGEMENT PLANT (STORAGE/PROCESSING RACK FOR PELLETS & COMPOST)





# Composting of canteen and garden waste in green campuses by Green Bandhu

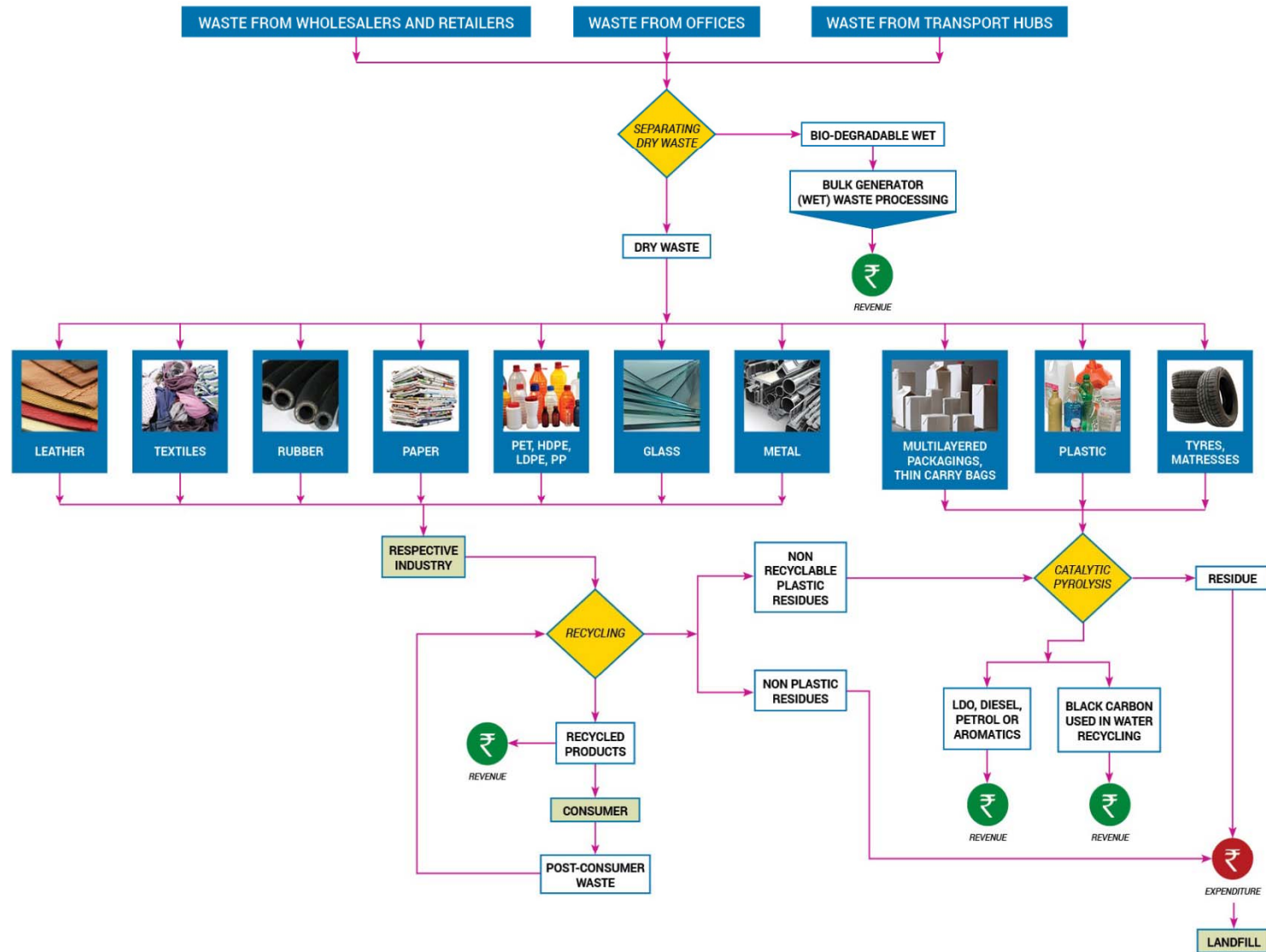




# SOLID WASTE MANAGEMENT PLANT (FOR HORTICULTURAL WASTE)



## BULK GENERATOR (DRY) – SEGREGATE AT SOURCE



# Bangalore 2015

**Transportation of Dry and Sanitary waste from Bulk generators**



**Dry waste donation collection from Individual Bunglows**





# Bangalore 2015 contd...

**Dry waste sorting at DWCC/ MRF**



**Separated and Stored for sale at DWCC/ MRF**



# Bangalore 2015 contd...

**Dry waste sorting shed with storage**



**Recyclables Rate List displayed at DWCC**

TO MAKE BANGALORE CLEAN AND GREEN  
An Initiative by ITC limited to create sustainable Livelihoods for Waste Collectors.

**Grade wise Purchase Price List**

Sl	Grade	Rate / KG
1	Dry Mixed Waste (Paper, Plastic, LVP, Tissue Papers) - MW	0.1
2	Sorted Dry Mixed Waste (Paper & Board) - DB	0.2
3	Plastic Bottles (PET, HDPE, LDPE)	1.0
4	Milk Pouches (HDPE, LDPE)	1.0
5	Hard Plastics (HDPE, LDPE)	1.1
6	Tetra Pack (HDPE, LDPE)	0.3
7	Kraft / Carton boxes (HDPE, LDPE)	0.5
8	Old News Papers (ONP)	0.9
9	Old Magazines	0.7
10	Old Note Books / Text Books	0.7
11	White Record (WR)	0.7
12	Metal (Iron)	15
13	Metal (Aluminium)	60
14	TIN (Metal - Magnet Check)	15
15	TIN (Aluminium)	60
16	Beer Bottles	0.1
17	Beer Bottles (PET)	0.3



# Zero-waste centre at Lakkadpur, Faridabad



• Tapas Chatterjee, CEO, ACT, says they are now educating ragpickers to segregate waste.

## Utility items from waste paper

Pawan Pandita  
pawapandita@indiatimes.com

While the authorities as well as the citizens are sceptical about the success of the Swachh Bharat Abhiyan without awareness and community participation, here is a non-government organisation, Action in Community & Training (ACT) that has already taken the lead in the direction. It has started recycling waste paper.

For their efforts in the last few years in community led waste management, ACT has been awarded by the United Nations Development Programme (UNDP), Global Environment Facility (GEF) Small Grants Programme (SGP) for the same.

Established in 1992, the year of the Rio Earth Summit, the GEF SGP embodies the very essence of sustainable development by thinking globally



• A group of women working in the waste paper recycling plant.  
ANIND KHAJA/HT PHOTOS

acting locally. By providing financial and technical support to projects that conserve and restore the environment while enhancing people's well-being and livelihoods, SGP demonstrates that community action can maintain the fine balance between human needs and environmental imperatives. Says ACT founder member Gurpreet Kaur, "We have been working in Lakkarpur Village, Faridabad, with ragpickers and other working children for the last five years. Together, we had stepped into waste recycling initiative as a source of livelihood for the underprivileged women about two years back. This women's group began with recycling tetrapacks, paper plates, etc into handmade paper last year. This year we took it a step forward into community led waste management and have been awarded aid from UNDP SGP GEF for the same."

a linkage with the Department of Biotechnology, Manav Rachna International University (MRIU). Head of the Biotechnology Department, MRIU, Dr Sarita Sachdeva said MRIU has been supplying 10 kg of waste paper a day for recycling to ACT. "Eventually, we will supply them waste paper generated in our schools," she said.

Since ACT's project has qualified for UNDP aid, they have contacted Deputy Commissioner, Faridabad. "We have met the regional officer, Haryana State Pollution Control Board, Faridabad," says Kaur.

Chatterjee says that as a way forward ACT had plans to tie up with the RWAs of nearby colonies such as Eros Garden and Charmwood Village and generate awareness for segregation of waste at the household level. "The residents will be mobilised to segregate dry and wet waste at the household level. Waste collectors will be trained to collect this waste separately during door-to-door collection," he said.

Added Kaur, "We know inculcating behaviour change is difficult but not impossible. Talks in this regard have already been initiated with the RWAs and some RWA members and participants have already begun to hand over their dry waste to ACT by telecalling. We look forward to make Charmwood Village a model with the cooperation of the RWAs, residents, market associations, schools and neighbourhood corporates."

Linkages for waste collection is also being now initiated with the National Institute of Urban Affairs, Centre of Environment Education, Ministry of Environment & Forests and a few other NGO offices in Delhi. In Faridabad ACT has been able to establish

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# Resources supply and logistics



- Segregated plastic waste is collected from the wards at Pammal and from the township at Kalpakkam



- Segregated Plastic Waste is transported to the project site at Natham-kariacheri
- Frequency of transportation – once in 15 days



# Plastic strips on handloom



- ◉ Two handloom structures are available and functional
- ◉ Water pouches and plastic carry bag strips are woven together on handloom
- ◉ Warp is the cotton thread and Weft is the plastic water pouches and carry bags
- ◉ Lakshmi from the nearby areas got trained on the job
- ◉ Plastic woven material for making 20 pieces are woven in a day

# Designing and tailoring



- ◉ A part-time designer designs trendy and useful products
- ◉ We have designed more than 40 varieties of products
- ◉ Plastic woven materials are woven and stitched according to designs
- ◉ Production is based on the demand for a product
- ◉ Completing 7 to 10 products per day
- ◉ 2 professional tailors do the stitching





# Marketing of Avthar products



- ◉ Marketing through word of mouth
  - ◉ People with Eco inclination
  - ◉ People who want to contribute their part to the cause
- ◉ Visitors to EGP
- ◉ Sales at Exhibitions



- Ebay – Pay pal Road show – October 2012
- Rotary Exhibition – Eat Festival – Nov 2012
- Infosys, Bangalore – Dec 2012
- Virtusa, Chennai – Dec 2012
- AECS School, Kalpakkam – Jan 2013
- Great Lakes Management Institute - Feb 2013
- L&T Green Day celebration – March 2013





# PolyAl products made from metalized plastics & straw





PolyAl products



# CSR supported NGO

**Women engaged in making products from waste**



**Recycled handicraft products**



# Roads of plastics vs Plastic Roads





# Waste Tyres to Oil



Waste tires oil refining: [www.huayinenergy.com](http://www.huayinenergy.com)

Waste tires oil refining: [www.huayinenergy.com](http://www.huayinenergy.com)

# Waste Plastics to Oil



# CSIR-IIP technology for waste plastics to Diesel



# Educating about Plastics



## Types of Plastics You're Using (And which ones you shouldn't)



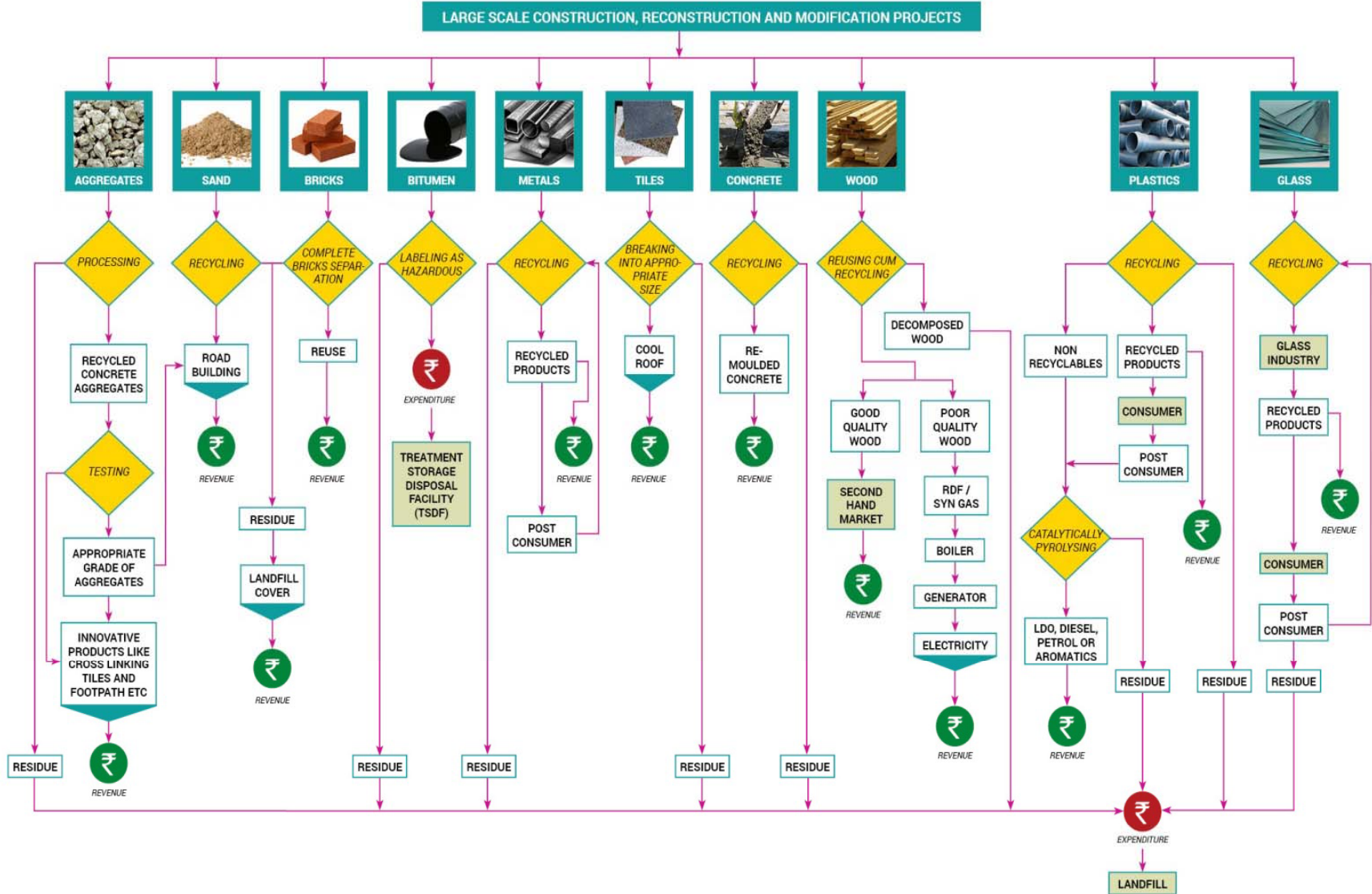
 Safest Choice  Use with Caution  Avoid



# Sustained Behavioral Change

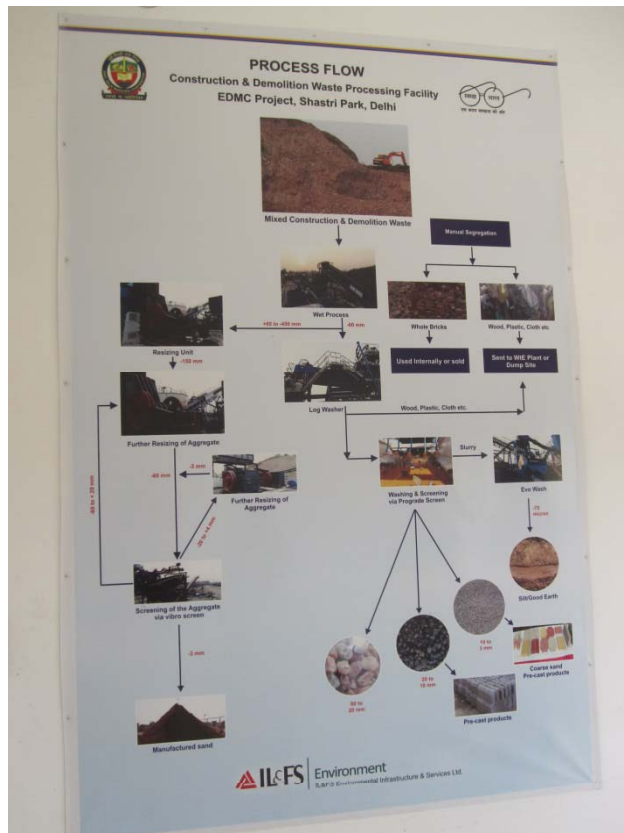


# CONSTRUCTION AND DEMOLITION WASTE



# Construction & Demolition Waste Recycling Plant

## Process Flowchart



## Coverage of Shastri Park Plant



# Equipment for C&D Waste Recycling





# Shastri Park C&D Plant

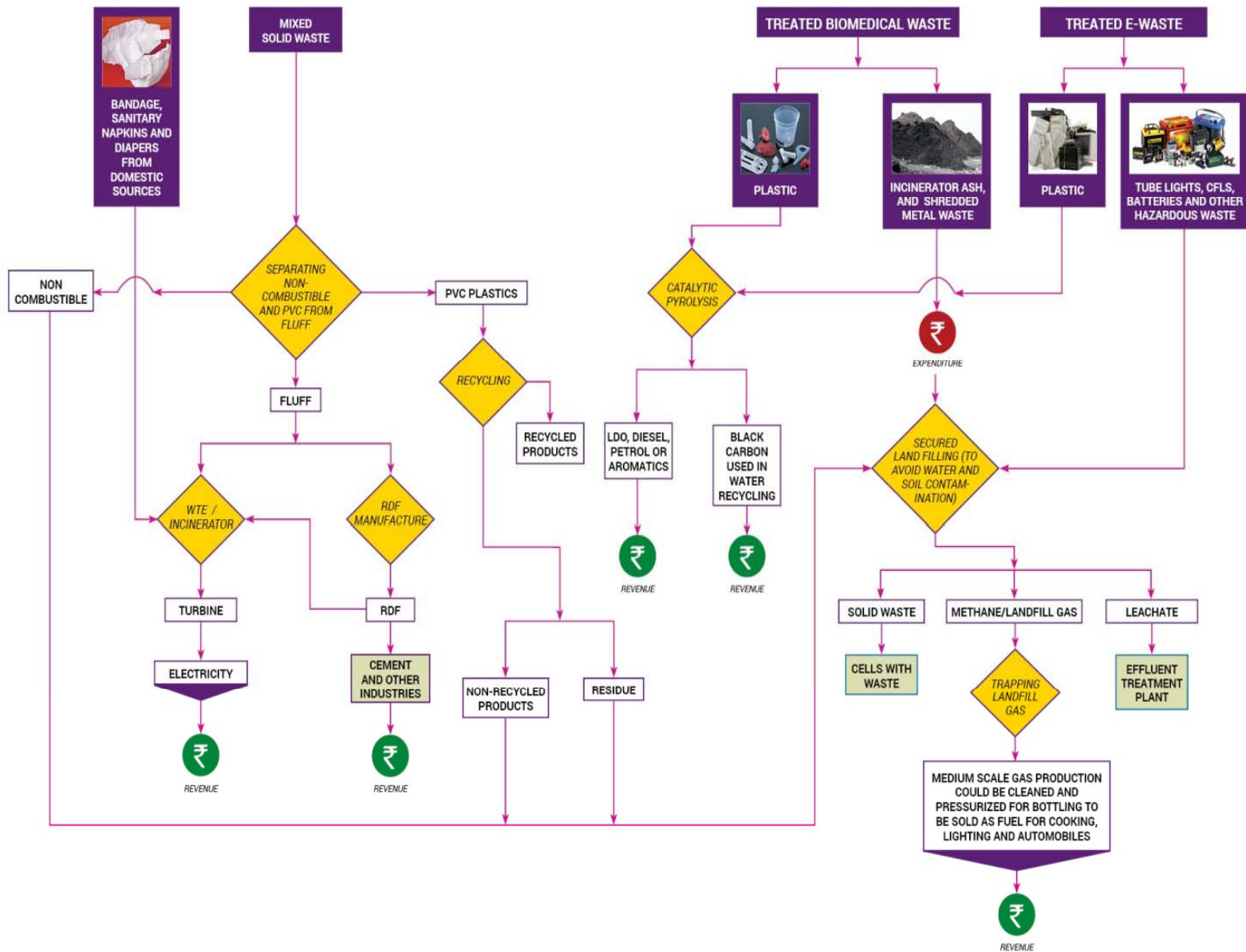
**Products from C&D waste  
recycling**



**Separation of Brick aggregates**



# COMMON SOLID WASTE TREATMENT FACILITY



# Common waste treatment facility

**Old dumpsites**



**Capping and gas recovery**





# Landfill gas trapping

**LFG scrubbing and electricity generation**



**Leachate treatment**





# Waste to Energy through RDF

**RDF preparation**



**Air Pollution Control Devices**



# Electricity generation

**Turbines**



**Leachate treatment**



# Bngalore 2015 contd...

**Restaurant and Bulk generator  
Wet waste sorting shed**



**Biomethanation Plant for converting wet  
waste to Biogas used for streetlighting**



# Conclusion

- There are plenty of opportunities for ULBs and Corporates in Waste Management from Decentralised to Centralised, from investment to CSR, from empathy to engagement, from collection to treatment.
- Working alongside communities, local bodies and achieving compliance is the best road forward for Swachh Bharat.



Thank you

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