Best practices of Solid Waste Management in Ahmedabad Municipal Corporation

(as on 10.07.2014)

Solid Waste Management Department Ahmedabad Municipal Corporation
Ahmedabad City

- 7th largest city of the India and largest city of Gujarat with above 06 million population and 26.61% decadal growth rate.

- Total area of the city increased from 192 Sq.Km. to 466 Sq.Km. in 2006.

- Density : 11,948 /sq. km.

- Literacy Rate : 89.60 %

- GDP pegged at 64 billion USD in 2012.

- Major base of trade, commerce and industry.
• Engine of industrial and financial growth of the state.

• **3rd fastest growing city** as per the Forbes magazine 2010.

• City plays a strong and significant role in providing commercial resources and market access for the economies of neighboring cities.

• City enjoys a thriving cultural tradition being the centre of Gujarati cultural activities and diverse traditions of different ethnic and religious communities.
Comparative study with year 2006

<table>
<thead>
<tr>
<th>Details</th>
<th>Year 2014</th>
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</thead>
<tbody>
<tr>
<td>Area (sq. k.m.)</td>
<td>466</td>
</tr>
<tr>
<td>Population (Lacs)</td>
<td>62.70</td>
</tr>
<tr>
<td>Wards</td>
<td>64</td>
</tr>
<tr>
<td>Staff</td>
<td>12500</td>
</tr>
<tr>
<td>Waste (TPD)</td>
<td>3600</td>
</tr>
<tr>
<td>Vehicles - Equipments</td>
<td>1173</td>
</tr>
<tr>
<td>Budget (Rs in Crore)</td>
<td>329.84</td>
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</table>
Ahmedabad’s Strength

- **Times of India** survey ranks our city as the **Best City to Live in** terms of infrastructure
- Ahmedabad will be the First Indian City to receive UNESCO's World Heritage City Status- Tentative Application accepted by UNESCO for the same
- Quality water, sanitation, and sewerage services
- High quality public transport system
- Financially well managed City Government
- Inclusive city and accommodates urban poor with sensitivity
- Ecologically friendly & Energy efficient
- Compact city with short travelling distances.
- Strong economic drivers and capitalising on them to create growth and jobs
- **Overall, the city offers a good quality of life and living standards**
Civic Administration of the City

Ahmedabad

- 6 Zones
- 466 Sq KM
- 64 Wards
- 192 Councilors

192 Councilors
The Ministry of Environment and Forest (MoEF), Government of India issued a notification on 25 September, 2000 under the Environment Protection Act 1986 stating that all cities and towns of India should undertake municipal solid waste management as prescribed by the rules. These are known as “The Municipal Solid Waste (Management & Handling) Rules 2000”.

- Generation → Collection → Transportation → Processing/Treatment → Disposal
Major Hurdles in MSW Management

- Non Segregation of Waste at Source.
- Low recycling percentage.
- Higher Landfill Leading to very high land consumption.
- Single stream technology like composting or RDF is unable to reduce the landfill percentage below 60%.
- Scarcity of land for Processing and landfill activities.
An Overview Solid Waste Management.

- Population of City is 60 lacs plus and daily per capita waste generation is more than 600 gms. City generates 4000 TPD waste including 300 MT of construction and demolition debris Waste. All waste is collected, transported, treated and disposed according to the MSW Rules.
Waste Characteristics

- Carbon/Nitrogen ratio generally varies from 30 to 50.
- Lower Calorific Value (LCV) for MSW is < 1000-1200 K Cal/Kg
- Moisture in MSW varies from 30% to 55%.
(A) Waste Collection System Of City

1. Sweeping of roads by employees.
2. Scrubbing of roads by mechanized sweeping machines.
3. Domestic Waste Collection by Door to Dump System.
4. Waste collection from open spots.
5. Lifting of Community bins / Containers.
10. Flower Waste Collection.
Deployment of Machineries & Equipments :-

AMC has deployed 89 Tipper Trucks, 32 JCB Machines, 33 Bobcat type machines, 120 Hydraulic Dumper Placers, 11 Skip Lifters, 54 Compactors, 4 Dead Animal Vans, 14 Nuisance Tankers, 1 Mobile Court, 60 Tractors, 3 Excavators, 5 Bull dozers, 3 Wheel dozers, 20 Road Vacuum Sweepers, 24 mini vans and other contactors’ 700 vehicles in all 6 zones. AMC deploys more than 1173 Total vehicles / equipments on daily basis for efficient handling of waste cleaning of the city.

(1) Sweeping of Roads by Safai Kamdar

1484 km roads are swept by more than 12,500 Street sweepers on a daily basis. Street sweepers are provided a lorry and 6 bins for cleaning activity.
(2) Night scrubbing through Road Sweeping Machines

- All major public roads, BRTS roads and Model roads are covered under this system.
- 15 heavy duty truck mounted sweeping machines are used
- Working time: 10 pm to 6 am
- Each machine has a cost of Rs. 64 lakh plus
- These machines are helping AMC to keep city as a dust free city.
(3) **Door to Dump System:**

- Collection of domestic waste from 14.50 lacs residential and commercial units are covered under Door / Gate to Dump project.

- More than 600 vehicles of Tata ACE with 1 ton capacity are deployed and more than 1700 TPD waste collection in this System.

(4) **Waste Collection from Spot:**

- AMC collect more than 1000 TPD waste from various spots in six zones by 130 tractors, trucks, JCB, etc, equipments & machineries.
(5) **Lifting of Bins / Containers**

More than 941 locations are defined as waste collection points where 1147 closed body 7 cubic meter M.S. Community storage bins have been provided. AMC ensures that these containers are lifted at least once in a day and 900 TPD waste is collected under this system.

(6) **Construction & Demolition waste collection**

Citizen are well informed to dump their C& D waste at their own cost at the defined 21 location. DNP Infrastructure Pvt. Ltd. is authorized by AMC on PPP mode to collect, transport & process 300 TPD C & D waste from designated 21 location of the city.
(7) **Segregated collection of kitchen waste from Hotels and Restaurants**

- AMC has contracted with three agencies, who collect food waste from such units and charge from hotel units on monthly basis so there is no cost to AMC in this system.
- 80 TPD food waste is collected from more than 950 units of hotels and restaurants.
- It is delivered to compost plant for treatment.
- AMC is in a process of planning to utilize food waste for Gas / Electricity generation by bio-methanation.

(8) **Collection of Municipal Bio Medical Waste**

AMC has contracted 2 agencies approved by GPCB for daily collection, transportation and disposal of bio-medical waste from 4 municipal hospitals, 2 referral hospitals, 64 urban health centers and dispose it in their incineration plant.
(9) Collection of carcass / Animal Waste

AMC has deployed 4 hydraulic based vehicles and staffs to collect carcass of dead animal like cow, camel, buffalo, donkey, dog, rat, etc. AMC has deployed 2 vehicles to collect fish, meat, slaughter house waste from market. 08 TPD animal waste is collected from the city under this system.

(10) Collection of Flower Waste

City has a historical Sabarmati river. To reduce pollution and maintain cleanliness citizens are motivated to deliver flower waste and such holistic materials in the “KALASH” instead of throwing into the river. AMC has deployed 10 “KALASH” on the 05 bridges of Sabarmati river. Such flower waste is delivered to compost plant for treatment.
(B) **Transfer Stations for Secondary Transportation of Waste :-**

- AMC has decided to construct one transfer station with capacity of 400 TPD in six Zone. Out of which 3 are operational and 3 are under construction. Civil & Mechanical cost of each transfer station is above to Rs.5.5 crore.

- Each transfer Station have 2 Stationary Compactors, 9 Large Hook Loader Vehicles and 11 Large Containers with 20-25 CMT Capacity to carry 10 to 12 MT waste.

- Compaction & Transportation of waste on each transfer station is about 350 TPD.

- Transfer station helps AMC to save on transportation cost, reduce pollution and ease traffic congestion, and effective & speedily collection of waste.

- AMC is planning to construct additional 6 Transfer Stations in zones.
Transfer Station
(C) **Best practices in Waste Management :-**

(1) **Decentralized Model for Effective Utilization of Garden / Green Biodegradable waste:**

- AMC started a Pilot Project in a Garden, Hotel Kitchen and other Green waste is converted into Organic Manure on PPP mode. A machine with the capacity of converting 200 kg of biodegradable waste into compost has been put on experimental basis for 60 days to observe the process and effectiveness of the machine. Such small plant to convert biodegradable waste to compost is also useful for residential societies, big hotels, canteens, etc.
With the experience of decentralized treatment/processing compost on plant of Pilot Project AMC has awarded work for design, build, operate and transfer of 2 bio-degradable waste convertor machines, each has a capacity of 1 metric ton, at Zoo and at Victoria Garden. Both Plants are in operation.

AMC is planning to set up a such more bio-degradable waste convertor machine/bio-gas plant at fruit/vegetable market for converting 5 to 10 TPD for effective utilization of Green Waste.
(2) **Mobile Court Initiative for Littering & Nuisance**

AMC launched country’s first Sanitation Mobile Court on 4\textsuperscript{th} June, 2009 dedicated to contain littering. 1,39,918 cases have been registered and Rs. 6.32 crore penalty levied from such offenders.
(3) Preparation of Public Health Byelaws

AMC has prepared Public Health Bye-laws for effective enforcement and maintaining discipline.

- Classification of waste in 25 categories
- Generators of waste based on their type, 21 categories
- Segregation of waste
- Storage of waste
- Delivery & collection of waste
- Processing & disposal of waste
- Liquid Waste Management
- Prevention of Waterborne, Vector borne and Food borne diseases
- Offences under the bye-laws
- General offenses which is applicable to all the citizens within city limit, (23 in number)
- Enforcement of the provisions
- Schedule of Fines

With the approval of Municipal General Board byelaws are sent to the State Government for Approval & Publication.
(4) **IEC Project for Awareness to citizens:**

- AMC has Started a Project for IEC (Information, Education, Communication) Activities and Awareness to the citizens Towards Cleanliness, Waste Treatment & Waste Disposal and get their co-operation & participation
  - Regular meetings of Committees in the Wards
  - Publicity through Television Channels / Local Cable Network
  - Advertisement in Newspapers
  - Distribution of pamphlets and Banners
  - Exhibition of Awareness Creation slides in Cinema Theatres
  - Conducting Street plays
  - Organizing of rally involving School & College students
  - Awareness training to Municipal staff and Councilors
  - Conducting miscellaneous even
(5) **Capacity Building of Staff** :-

- Safai Kamdar, Mukadam and supervisory staff is given training by experts to develop skill, knowledge updation, capacity building and strengthen the activities.
- Seminars and Workshops are conducted periodically to update the knowledge.
- Officers are sent for visit to oversee the status of other cities.

(6) **Welfare Activities**:-

- 1984 Permanent safai kamdars are allotted houses. 500 more houses are under construction.
- Health Check up of safai kamdar is carried out regularly.
- Promotion given to 63 Safai Kamdar as a Sanitary Sub Inspectors.
- A policy is in procedure for temporary safai kamdar to make permanent employee of Ahmedabad Municipal Corporation.
**(7) A Project of GPS in Waste Management**

**Name of the Initiative:-**
Installation of RFID based GPS system to the vehicles deployed for collection & transportation of solid waste management of Ahmedabad city. AMC has assigned a work to provide GPS-RFID based monitoring system for effective supervision of more than 900 vehicles deployed in waste management.

**Scheme Under Which the Initiative has been taken up:-**
- Domestic Waste Collection by door to dump system
- Lifting of Community bins-containers
- Hotel Kitchen Waste Collection

**Cost of the project and the funding pattern:-**
- Capital cost is Rs: 281,44,095/ and Operation and Maintenance for five years Rs: 198,05,136/. Total cost of project is Rs.479,49,131. Cost is shared between AMC & Contractors who had assigned a work of garbage collection & transportation on PPP mode.
Main features of the scheme including modules:-

- Satisfactory response to civic complaint
- Management of fleet of vehicles with time
- Information of collection of solid waste of each route and vehicle with time
- Working of vehicles can be seen on map
- Increase in service, accuracy and safety
- Integration of dump site, weigh-bridge
- More effective system of collection of solid waste
- More effective of assessment of working of contractor
- Trustworthiness of payment of contractor
- City Ahmedabad will be more neat & clean

Status of the project that likely date of completion:-

- Deploying of RFID tags more than 1000 bins and 900 vehicles with Control Room set up is expected to complete up to June-2014.
## (D) Waste Treatment / Processing :-

### (1) Existing Plants / Facilities :-

<table>
<thead>
<tr>
<th>Name of Company</th>
<th>Daily Treatment</th>
<th>MSW converting into</th>
<th>Land Given (Acres)</th>
<th>Agreement Period</th>
<th>Technology Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UPL Djai Power Ltd</td>
<td>250 Tons</td>
<td>Compost and RDF / Pellets &amp; Fluff</td>
<td>15</td>
<td>25 Years</td>
<td>Windrow Method</td>
</tr>
<tr>
<td>2. Creative Eco-Recycle Port Pvt. Ltd.</td>
<td>800 Tons</td>
<td>Compost and RDF / Pellets &amp; Fluff</td>
<td>12.5</td>
<td>25 Years</td>
<td>Gasification &amp; thermalization Spiritless</td>
</tr>
<tr>
<td>3. Hanjer Biotech Energies Pvt. Ltd</td>
<td>500 Tons</td>
<td>Compost and RDF / Pellets &amp; Fluff</td>
<td>12.5</td>
<td>30 Years</td>
<td>Multi Product Integrated Technology</td>
</tr>
</tbody>
</table>
MSW Treatment / Processing

<table>
<thead>
<tr>
<th>Name of Company</th>
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<th>Technology Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Excel Industries Ltd.</td>
<td>250 Tons</td>
<td>Composting</td>
<td>25</td>
<td>15 Years</td>
<td>Windrow Method</td>
</tr>
</tbody>
</table>

(2) C & D Waste Treatment / Processing :-

- DNP Infrastructure Pvt. Ltd has been awarded the project on PPP mode for Design, Construct, Operate & Maintain 300 TPD plant for Construction & Demolition waste Processing Treatment to produce final products likewise Bricks, Hollow block, Paver Block, Curbstone, Concrete, etc from C & D Waste of waste from designated locations (24) from city area on Public Private Partnership mode for 30 years.
- AMC has allotted 5 acres land for processing plant. The Plant is under trail run and on experiments. It will be functional shortly.
- AMC will get 2.5% royalty on sale value.
(3) **Additional Two Companies are assigned processing Work :-**

For the remaining untreated waste AMC has assigned work on PPP mode to two companies for setting up Treatment / Processing of waste Plants. Which are expected to start from 2015.

<table>
<thead>
<tr>
<th>Name of Company</th>
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<th>MSW converting into</th>
<th>Land Given (Acres)</th>
<th>Agreement Period</th>
<th>Technology Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Abellon Clean Energy Ltd.</td>
<td>1000 Tons</td>
<td>Electricity</td>
<td>13</td>
<td>29 Years</td>
<td>Use European technology and follow European Emission Standards.</td>
</tr>
<tr>
<td>2. A2Z Infrastruct ure Limited</td>
<td>1000 Tons</td>
<td>Compost and RDF/ Pellets &amp; Fluff</td>
<td>25</td>
<td>29 Years</td>
<td>Multi Product Integrated Technology</td>
</tr>
</tbody>
</table>
(E) Disposal of Inert Waste:

AMC has secured engineered landfill site in operation and made provision for another five scientific landfill sights for Disposal of Inert / Post Process Solid Waste at Gyaspur.

Capacity:

11.50 Lakh Metric Tones
(i.e. 1.15 million tons)

Total construction cost of the site:

Rs. 13 Crore
(i.e. Rs.130 million)

Area: 12.88 Hectares
(32.8271 acres)

AMC is in a process of planning for set up another secured engineered landfill site facility.
(F) Future planning to strengthen the system

1. Collection, Transportation & Safe disposal of E–waste
2. Scientific and safe disposal of Carcass of Animals & Waste from Slaughter House, Fish Market, Meat Market etc.
3. SWM Master Plan up to 2031
4. Roadmap for Zero Waste Ahmedabad by 2031
5. EOI for 1000 TPD waste treatment
7. Capping or Land Reclamation Project of Present Dump Site
(1) **Collection, Transportation & Safe disposal of E-waste**

For effective implementation of e-waste (Management and Handling) Rules, 2011 in city. AMC has assigned a work to Ernest & Young Consultant who Co-ordinate with Corporate Sector GPCB, dealers, producers, etc to prepare effective plan & strategy, IEC plan, Finalise player on PPP mode activity to establish the collection centres for e-waste collection, safe transportation and safe storage / disposal. RFQ-RFP is invited and process is on to finalisation the player for collection, transportation & disposal of E-waste.

(2) **Scientific and safe disposal of Carcass of Animal & Waste from Slaughter House, Fish Market, Meat Market etc.**

AMC is in the process to explore best suitable technology. AMC has assigned a work to a Consultant Ernest & Young to finalise RFQ a competitive Bid for Design, Construction, Operation & Maintenance of a daily 8-10 tons processing plant on Public Private Partnership mode for 30 years with the help.
(3) **SWM Master Plan upto 2031**

AMC prepared a SWM Master Plan which provides a detailed profile of Ahmedabad City, existing system in city, solid waste characteristics, current leading waste management practices, strategy and options for city, planning for 'Zero Waste' management system, institutional strengthening and training, capital investment plan and need for monitoring & evaluation.

**Process adopted**
- Process tracking of all streams of SWM
- Numerous stakeholders’ consultations
- Strategy development towards zero waste
- Infrastructure gap and management assessment
- Recommendations and capital investment
AMC has participated at the Special Event of ISWA World Congress 2011 and agreed on the “Declaration for Zero Waste Ahmedabad” by 2031. AMC has signed a Memorandum of Understanding with UNCRD (United Nations Center for Regional Development, Japan) to get technical assistance for developing a “Roadmap for Zero Waste Ahmedabad by 2031”. AMC had a detailed Multi-stake holders' consultation meetings with the help and support from UNCRD Japan and Zero Waste South Australia.

(4) **Roadmap for Zero Waste Ahmedabad by 2031**
The Zero Waste concept for Ahmedabad will serve as catalyst for policy changes at National level in realizing resource efficient and zero waste societies in India.
(5) **EOI for 1000 TPD waste treatment**

AMC has planned for 100 % Processing / Treatment of waste generated from City on daily basis. RFQ bid is issued for additional 1000 TPD waste treatment / Processing on PPP mode. Process is on to finalize the player. So in next 3 Years AMC can Treat / Process 100 % Waste in effective manner. Received five offers in RFQ & technical evaluation is in the process.

(6) **Decentralized Bio-Gas Plant**

AMC is in a process of planning to set up decentralized bio-gas plant of 2 to 10 ton capacity in different Zones / location of city to utilize vegetable, food waste, flower waste, green waste, night soil, to generate bio-gas and energy.
(7) **Capping or Land Reclamation of existing Pirana Dump Site**

- Legacy Solid Waste is being disposed & accumulated at Pirana dumping site having total area of about 84 acres for a long back.
- 65 acres of land is accumulated with heaps of garbage having 15-20 meter height.
- AMC has planned a project for Capping of the site or Reclamation of the site on PPP mode.
- AMC has received offers from private Parties to provide feasible solution of legacy waste. AMC has initiated process to evaluate the offers by expert of waste management sector.
Opportunities to work with AMC on PPP mode

- AMC requires help of private players in PPP mode in waste treatment/processing under different system.
- Processing of Mix Municipal Solid waste into compost, RDF, fuel, energy etc.
- Treatment of vegetable, fruit, flower waste into composting
- Bio-gas generation from food waste, green waste, night soil
- Processing of Construction and Demolition waste
- Treatment of fish, meat, carcass etc. animal waste
- Processing of Electronic Waste
- Treatment of Plastic Waste,
- Processing of recyclable
- Disposal of Legacy Waste of Dumping site
- Capping of site
- Land fill mining and Reclamation
- Transfer station and heavy machineries and Equipments
ISWA has awarded third prize to AMC for best Short film giving message for public awareness

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Thank You