Acknowledgement

"BBMP has come up with an Integrated SWM Policy to provide better services for the citizens of Bangalore city. We would like to get your valuable suggestion and feedback on the draft policy made. You can send us your feed back to the following e-mail-id's

stshbv@gmail.com or evnengbbmp@yahoo.com.

BRUHAT BANGALORE MAHANAGARA PALIKE

DEPARTMENT OF ENVIRONMENTAL CELL

POLICY ON

INTEGRATED SOLID WASTE MANAGEMENT

2012

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1. INTRODUCTION

"Integrated Waste management is a national resource saving through reuse, recycling and composting , further can lower the costs for the city"

Municipal solid waste is one of the most challenging tasks being handled by Urban Local Bodies. With rapid urbanization, industrialization and changing life styles are complicating this issue even more. Bangalore is facing this critical situation which has resulted in significant increase in Municipal Solid Waste generation in the last few years.

As per the legal requirements (Municipal Solid Waste (Management & Handling) Rules, 2000 it is mandatory for all municipal bodies to prohibit dumping and littering of solid waste anywhere in the city; to make it mandatory for the generators to segregate and store waste at source; for municipal bodies to collect such segregated waste directly from the households and transport it to designated places; to recycle dry waste;(as per Plastic management Rules) to process biodegradable waste by composting or any other suitable methods; to send waste that cannot be processed and the residue after processing to the sanitary/scientific landfill site. Similarly, Municipal bodies have to ensure handling of biomedical waste as per Bio-Medical Waste (Management &Handling) Rules, 1998 and e-waste as per e-waste (Management & Handling) Rules, 2011.

The Municipal Solid Waste Management Rules 2000 should have been implemented by ULBs by December 2003. Very few municipal bodies have met this deadline. However, awareness about its compliance is remarkably on the rise among the ULBs, especially in BBMP. More important, a large number of initiatives are being undertaken to comply with the Rules. Some of these initiatives are successful, some are in the process, and some are not so successful.

Solid Waste Management has become a major environmental issue. Bangalore city had 56.86 lakh of population in 2001 which has increased to 84 lakhs in 2011 including the newly merged area accounting to a population density of 10,500 persons/sq.km. The per capita MSW generated per day in Bangalore is about 500 grams and MSW generation in the city has increased from 2500 tons per day to 5000 tons per day in a span of 10 years. (SWM Master plan)

This clearly indicates that the growth in the MSW in Bangalore has outpaced the population and economical growth in recent years. This is largely because of the temperate climate, high quality educational, scientific and technology institutions coupled with a thriving IT and Bio-Technology and Employment opportunities

which makes Bangalore one of the most sought after global destinations, resulted in migration of people to Bangalore.

The Solid Waste Management is one of the obligatory functions of the Bruhat Bangalore Mahanagara Palike serving the entire city (as per the KMC Act). SWM in Bangalore has definitely gone through a modernization and upgrading process in relation to collection, transportation and disposal.

2. NEED FOR THE POLICY

The changing nature of solid waste in Bangalore is demanding for a renewed focus and strategy for its effective management. It is essential to have a derived vision and policy to carry forward the solid waste management system in BBMP in a sustainable manner in the growing IT City. Hence BBMP is framing this policy which will guide the organization to implement the waste management in future in compliance with the regulatory framework of state's Solid Waste Management.

Urban Development Department had notified an exclusive State Policy for Integrated Solid Waste Management for Urban Local Bodies in the year 2004. As Bangalore city is unique in its growth and expansion compared with other Urban Local Bodies hence there is a need for a unique policy in itself for the city.

3. POLICY'S OBJECTIVE

The objective of this Policy is: -

- Developing a common vision guidance plan and micro level planning for primary waste collection, secondary transportation, bulk waste management, processing and disposal.
- Decentralized levels of waste collection, processing and recovery by involving local stakeholders thus decreasing the waste quantity for secondary transportation and reducing the extent of waste to be handled at landfills.
- Develop a appropriate waste management systems by bulk generators
- Inclusion of informal sector of waste workers that includes waste pickers, itinerant buyers scrap dealers and other waste traders by recognizing and leveraging the recycling industry as an opportunity of poverty alleviation and generating livelihoods for workers
- Recognize and legalize the primary role played by the informal waste industry in reducing managing and recycling of waste and contributing to sustainable cost effective waste management systems

- Creating awareness to public for active participation through media, radio, newspaper, door to door motivation program, street jhatas etc. in partnership with local RWAs, NGOs CBOs, Individuals Schools, colleges, Universities, Hospitals and other institutions
- Encouraging Public Private Partnership active participation in segregation, recovery of recyclable, storage of waste at source, antilittering and handing over the waste to primary collection system.
- Effective SWM collection in low income and slum areas
- Introducing effective cost recovery system from waste generators in terms of User Fee Collection, penalty etc. to run the system in a sustainable manner.
- Rearranging the staffing pattern under SWM at head and zonal office levels.
- Institutional strengthening and human resources development through capacity Building, fixing work norms etc.
- Mechanical handling of wastes using auto-tippers, and push carts can be encouraged to minimize human contact.
- Usage of technologies for effective monitoring of SWM

4. ACTION POINTS

The Bruhat Bangalore Mahanagara Palike (BBMP) is accountable for the implementation of the provision of the MSW rules. Effective municipal waste management requires a number of actions to be carried out concurrently. For Successful Management, the Solid Waste activity has broken down into smaller and simpler 'Action Points'. Fifteen such Action Points have been identified; these Action Points can be implemented concurrently or in phases to achieve the desired results.

The Action Points specifies "what" needs to be done, these can be categorized into following five broad categories:

(1) Separate collection & management of Waste from bulk generators
(2) Setting up systems for Door-to-Door Collection, Segregation & Transportation;
(3) Setting up systems for Road sweeping & Nuisance detection;
(4) Decentralized Waste Processing and scientific Landfill Management;
(5) Responsibility of BBMP towards Plastic waste, Bio Medical waste, Hazardous waste and e-waste rules

1: Separate Collection and Management of Bulk Waste

Implementation of the policy should start with bulk waste generators. This perhaps is

the most critical and cost effective way for waste management in the city. Usually bulk generators accounts for 30-40 per cent of city's total waste. These generators are less in number and can be more easily covered. It is possible to achieve early successes by concentrating on these bulk waste producers, initially. The waste processing is also easier if such bulk waste is not allowed to get mixed with rest of the city waste. Such waste is more homogeneous / concentrated (containing mostly wet garbage) and thus can easily be recycled / composted or used as a land fill (debris) without additional cost incurred on segregation.

This can save valuable space in land fill site. It is offense to dump debris in land fill sites obtained and developed after lot of effort. Similarly, waste from markets and eateries can be composted into organic fertilizers instead of ending in land fill. Independent collection and transportation of waste from bulk producers helps in establishing a system of collection and transporting segregated waste. Separate vehicles shall be allotted to collect segregated waste from bulk producers. Also the bulk waste generators may be insisted to process their waste by having biometanization plant, or Organic waste converter.

Service or user charges can be recovered from such producers who hand it over to BBMP and for the generators who process the waste by themselves incentives may be given. The KMC Act shall be amended for incentives and levy of special SWM cess on hotels, restaurants, cattle sheds, etc. These generators can also afford to pay the service charges.
The following type of waste could be collected and managed separately.

- Waste generated from construction materials/ debris
- Waste generated at restaurants, canteens, marriage/party halls, temples Places of worship. Vegetable & fruit markets, slaughter houses, meat and fish market. Goshala , piggeries
- Waste generated in parks and gardens, household garden waste, etc.
- Waste generated during exhibitions, fairs, religious assemblies, conferences etc
- Waste generated in Malls, Tech parks, corporate campuses, schools colleges
- Specific waste generated in a proportionally large quantity in a city.

Plan of Action 1:

(a). Collection and Disposal Mechanism for Construction Waste / Debris

Debris, sand, earth, bricks, building materials, etc. were dumped on roads and footpaths causing hazards to traffic and pedestrians. It also resulted in unclean roads and streets. The responsibility of storing and landfill of construction waste should fully and squarely lie on its generators. BBMP shall arrange for collection and

transportation of debris through appointed contractors who can be allowed to charge the generators at a predetermined rate. The contractors can also be allowed to recycle or "sell" such debris to other construction sites that require land filling or It can also be used for making brick and tiles. It is mandatory for citizens to get their debris removed through the helpline system. For this, the debris generators are charged per truck. Debris generated from individual home/ office/ school etc will be charged, depending on the quantity

(**b). Collection Mechanism for Bulk Waste Producers**

A separate system shall be put in place to collect waste from large waste producers like hotels, restaurants, marriage halls, slaughter houses, markets, shopkeepers, roadside hawkers, offices, cowsheds, etc. Bulk waste shall be collected at a specific time suitable for that category of generators. For example, hotels and eating houses could be covered during the night, while fruit & vegetable markets, meat & fish markets, abattoirs, shops, etc could be covered at market closing hours. Waste may be collected more than once from wholesale vegetable markets where waste in the early morning hours, and if not cleared, piles up emanating bad stench. Enlisted Private agencies (RWAs, SHGs, NGOs, Co-operatives, collectives, Trusts and other institutions) shall be appointed for door-to-door collection, transportation and treatment of waste from bulk producers. Service charges need to be levied on bulk waste generators to recover the cost. It would be ideal if the charges are directly collected by the agency. Incentive should be given to the operators to inform the BBMP about the defaulters, thereby motivating them to perform, as well as helping in monitoring and penalizing the defaulters.

BBMP has around 900 hotels and 200 marriage halls. Amendment need to be brought for Bulk biodegradable waste generators from restaurants, marriage halls, etc to be processed independently onsite through vermi-composting / biogas generation etc. Such large sources of waste shall be identified. An awareness drive would be essential while tackling bulk waste producers. Trade associations can be taken into confidence and methods to independently handle their waste can be discussed and finalized. Where possible, the association can be involved in identifying the agency. (RWAs, SHGs, NGOs, Co operatives, Collectives, Schools, Colleges and other Institutions who can process the waste onsite) and the members can pay service charges to the agency directly as fixed by BBMP. Enlisted Private agencies shall be open for inspection by BBMP on their disposal methods as to recycling of dry waste, composting of wet, organic waste and land filling of rejects

Many of the waste generators like eateries, coffee shops, pizza huts etc., are running shortage of the storage facilities for storing the waste resulting in the road side dumps. It is necessary for all these generators to keep the required capacity bins on Area of premises, volume of waste generated and number of people who use or visit the premises which are readily available in the market, in order to avoid the

unauthorized dumping.

(c). Handling of Garden / Green Waste

Green waste and foliage from BBMP parks and gardens should be collected within such premises for converting it into organic fertilizer that can be used as fertilizer there itself. Even from private houses, garden waste, dry foliage and biomass shall be separately collected and lifted. The garden waste may be lifted once a week instead of daily collection. This could be on a specific day in a week (say Monday, since citizens are likely to tend to their gardens on a sunday) through a separate vehicle. Citizens could be forbidden from dumping garden waste on other days. This Foliage and garden waste can also be converted into manure at decentralized or centralized locations through the use of SHGs, waste picker co operatives.

(d). Handling of waste from Public gathering

For Public Gatherings and Events, organised in public places for any reason (including for processions, exhibitions, circuses, fairs, political rallies, commercial, religious, socio-cultural events, protests and demonstrations, etc.) where Police and/or BBMP permission is required, it will be the responsibility of the Organiser of the event or gathering to ensure the cleanliness of that area. A Refundable Cleanliness Deposit, as may be notified by BBMP, will be taken from the Organiser, by the concerned ward office for the duration of the event. This Deposit will be refunded on the completion of the event after it is noted that the said public place has been restored back to a clean state, and any waste generated as a result of the event has been collected and transported to designated sites. (This deposit will be only for the cleanliness of the public place and does not cover any damage to property.) In case the Organisers of the event wishes to avail of the services of BBMP for the cleaning, collection and transport of waste generated as a result of that event, they must apply to the concerned Ward Office of BBMP and pay the necessary charges as may be fixed for this purpose by BBMP. Additionally, event organizers can also avail the services of private agencies, service providers, Waste-picker Collectives or Cooperatives authorized by BBMP who can handle them independently to segregate waste and will be entitled to recycle all the dry waste and adequate provisions shall be made with BBMP to pick-up wet waste and rejects.

Table specifying Bulk generators who need to set up onsite processing units

Hotels /Restaurants (including which are in Malls also) generating more than 200 kg of wet waste per day
All Choultries/Marriage halls, conventional halls generation more

than 200 kg of wet waste per day
Temples generation more than 200 kg of wet waste per day
Apartments with more than 100 units
Institutions with more than 1000 students
*BBMP shall collect the dry waste and the rejects from all the above bulk Generators

Plan of Action 2:

(a) Door to door collection of Waste, Segregation & Transportation

The present system of waste collection is a losing battle. Residents need to handover the waste to the door to door collector coming with pushcart or Auto Tippers. vehicle is expected to come with covered vehicles / compactors and empty the pushcart and Auto Tipper . Separate staff to clean the roads in the morning is provided. Things rarely work as they are planned. While the roads are cleaned in the morning, the traders, after cleaning their shops soon dump their waste onto the roads. The households also dump their waste onto the roads. and all possible nooks and corners, nallahs, gutters, water bodies, etc. Pedestrians and hawkers add to the problem since litter bins are mostly not provided Garbage is littered around the collection point. Cattle, dog, rodents are a common sight around them. The waste block the limited footpath space. All this add up to give a city an unclean look. Door to door collection has to be the starting point for a good waste management system. Along with this the residents have to be told the manner in which the BBMP would accept the waste, and a mechanism has to be in place to enforce this system.

(b) Handing over waste to BBMP

The first step is to specify how the residents may place waste on public places. The citizens do not have an unfettered right to throw their waste on public lands. The articles 48A, 51A(g) and 253 state that environmental protection is not only a fundamental duty of citizens but also a responsibility of the parliament to make appropriate rules regarding it and hence it is the statutory obligation of BBMP to protect the environment & maintain hygienic conditions in the city. This is only possible when it specifies what the people may "do" and "not do" on BBMP property. It is thus now necessary to specify the manner in which the citizens can hand over their waste. The primary requirement is as following:

- While the households shall required to segregate their wastes into only two categories, Wet and Dry, bulk waste producers shall also segregate their dry waste into paper, plastics, bottles and others. The hawkers can be asked to keep

small bins and empty them into a specific place every day. The motor garages can be asked to store the hazardous waste separately.

- Depositing debris & construction material and prohibit its mixing with normal municipal waste.
- Each waste generator must keep bins in their respective premises to store waste till such time it is collected by it.
- Littering by people moving on foot or in vehicles is prohibited and requires them to deposit waste only in litter bins provided for the purpose.

This has to be followed with a will to enforce the same. Nuisance occurs in public places when people do not respect the rights of the society at large. While the waste generators shall be encouraged and motivated to follow the specified methodology, at some point of time enforcement would be necessary.

(C) How much to segregate?

Segregation of waste initially can be into two categories, dry and wet waste and at the latter stage household hazardous waste like discarded medicine, sanitary napkins, diapers, batteries paints etc separately.

BBMP shall cover all waste generators through door to door collection. The policy mandate that no waste shall be thrown on the streets, footpaths, open spaces, drains or water bodies. The waste is to be stored at the source of waste generation in two bins/bags. BBMP shall collect waste directly from the generators and transport it to the processing site. This is an important step in the entire chain of solid waste management. Without this it is not possible to identify generators who do not give segregated waste. Also if an effective system of house to house collection of waste, take place then it led to clean roads and more space for pedestrians.

(d) Collection Mechanism for Different Residences.

Separate collection mechanism needs to be evolved for covering large housing complexes Apartments & housing societies, individual row houses and slums. Housing complexes, Apartments, multi-storied buildings and societies shall collect segregated waste from each household and store it at a common point within their complex. This can be near the entrance from where an operator can easily lift the same. **The building bylaws must require all such large complexes to provide for a separate space for placing of such common bins near the entrance / guard room.** The larger mechanized vehicles like Auto Tippers/compactors are more suited for covering areas with housing societies / large housing complexes. On the other hand, puchcarts are more appropriate to cover slums and congested localities. Auto tippers are ideal for row houses.

(e) Poultry, Fish and Slaughter Waste (from all areas other than designated slaughter houses and markets)

Every shops other than designated slaughter houses and markets, who generates poultry, fish and slaughter waste as a result of any commercial activity, shall store the same separately in closed, hygienic conditions and deliver it at a specified time, on a daily basis to BBMP collection vehicle provided for this purpose.

(f) Vendors/Hawkers:

All vendors/hawkers shall keep their bio-degradable and other waste unmixed in containers / bins at the site of vending for the collection of any waste generated by that vending activity. It will be the responsibility of the generator/vendor to deliver this waste duly segregated to the Primary collection vehicle of BBMP.

(g) Community to monitor services.

BBMP shall involve the local residents in monitoring services provided by the Contractor. The operator engaged for door to door collection has to submit the signatures of respected citizens of the ward for satisfactory work, at the end of every month, failing which the monthly bill is not be cleared. The residents involved confirming the quality of service by providing signature shall be different each month, this will ensure that operators are reaching out to more and more citizens in the locality. This will also improve the ownership of solid waste. To put in place a system where, the residents can phone up a dedicated telephone number in case the vehicle does not come to collect the waste. They ensure that the service is provided daily and also monitor that the area is cleaned daily and properly. Daily BBMP inspections, Daily attendance of the workers may not be required. This saves lot of time. Such involvement of citizens also helps create awareness and ownership with the community.

(h) Handing over the Segregated waste during door to door collection

Waste segregation at source is crucial for effective solid waste management. Without this all efforts on other aspects of waste management will not achieve the optimum results. Presently, to speed up implementation of SWM Rules, the requirement of segregation at source is neither emphasized, nor enforced. The waste is sometimes manually segregated. Mixed garbage is simply collected and disposed directly on to processing and land fill site. Many even question the need to segregate waste. Waste segregation and its storage at source is essential as per the Rules. BBMP must quickly put in place a system to collect only segregated waste from each of the generators.

Bio-degradable waste shall be collected from the doorstep on a daily basis.

Recyclable waste material / non biodegradable waste other than toxic and hazardous waste will be collected once in a week and at a frequency and in the manner, notified by the BBMP from time to time. Waste such as used batteries, containers for chemicals and pesticides, and other toxic or hazardous household waste, should be kept separately from the above two streams of waste. This should be handed over to BBMP once in a month at a specified date as notified by BBMP from time to time.

(i) Dry waste Management

When access to dry waste is given to the collector, it acts as an inbuilt incentive for them to encourage / coax each generator to segregate their waste there is very strong inbuilt incentive to encourage each generator to segregate its waste. It has to be remembered that not all dry waste is recyclable. Residents are not always able to give away all the dry waste produced by them. While they may be able to sell / hand over plastics, paper, card board, metals, etc to Kabadiwallahs, waste pickers, , etc, there would be some dry waste which has no resale value. This would include thin plastics, broken tube lights & bulbs, small empty bottles, and the like. The dry waste does not decompose and hence it is possible for the generators to store it for a longer period. Hence it will be collected once in a week. A separate trip of vehicles exclusively to collect dry waste (for large housing complexes and society buildings) would be provided. This would avoid the need to have vehicles with two compartments. The wards could be divided into 6/7 sectors and a trip to collect the dry waste could be collected once in a week.

(j) Waste reduction

In the first phase, waste can be minimized by bulk generators. Bulk generators will include Malls, Tech parks, Schools and instititutions with more than 1000 students , Public office and corporate campuses, residential housing complexes over 100 units, places of worship, Markets, choultries, kalyan mantaps .They can be encouraged to process it themselves through biogas, vermi-composting projects being established in big complexes, hotels etc. Apart from bulk waste generators, residents' groups in housing complexes must be mandated to set up small composting facilities. Composting facilities on top of municipal drains for decentralized composting by resident associations can also be encouraged as there is land constrains. The manure can be used for growing trees within the society garden itself.

(k) Set up Dry Waste Collection Centre (DWCC)

Reduction of waste is also possible by setting up purchase / processing centers for dry waste, like plastics, paper, etc. Dry waste collection center shall be set up by BBMP in all the wards.

DWCC are already established in couple of wards of BBMP, it is one of its kind and first time in a metro a DWCC concept is established. These DWCC will be called Kartavya – meaning duty that will remind the public of their duty towards recycling the waste they have created. This will be in their own neighborhood and over a period of time the Kartavya centers will become part of the local community fabric. Physical structure are now are being constructed uniformly to bring in recognition and build brand that will remind people about segregation, the dry waste and their duty.

Dry waste–shall be stored and delivered to the dry waste collection vehicle which shall be provided by BBMP or its Agents at such time as notified by BBMP from time-to-time or to the licensed DWCC set up on municipal / Government / private lands. NGO's, RWA's, SHGs, collectives. Institutions, Trusts, Universities, Companies, licensed recyclers or scrap dealers may be appointed as the sole Licensed Agents of BBMP for maintaining dry waste collection centres and /or operating such dry waste sorting centres.

SHG's/Waste pickers who come forward to maintain the DWCC, the deposit amount has to be Rs.5000/-. A separate MOU will entered into by the BBMP and the operator In addition, if corporate companies come forward to provide gap funding required under the EPR (Extended Producer Responsibility), A triparty agreement shall be made to manage DWCC, with a deposit of Rs 25,000/- Such centers also ensure that the recyclable material is sold through properly created channels to ensure that the recycled goods are not misused. The dry waste collected shall pay the pourakarmika /Public/Waste-picker or any individual who bring the waste to the centers as notified by BBMP from time to time, which will encourage the public to segregate the waste at source.

Enumeration of the waste pickers
As recognition of existence and contribution of informal workers of waste in the city who diverts large amount of recyclable waste from MSW, BBMP has registered and issued identification cards to wastepickers, waste itinerant buyers and waste sorters. The scrap traders are enumerated in the city and this will better the condition of informal waste trading, recycling and facilitate diversification of waste. This will help quantify the waste that is recycled in the city. It is hoped that this type of periodic information gathering of waste diverted will contribute for better estimation of waste generated and also plan appropriate waste management system.

(l) Transportation of Wet waste directly to the processing Site

Segregated wet waste shall be collected at the door step and directly transported to the processing site. This not only gives economic benefits, it also prevents residents who do not segregate waste from dumping mixed waste, once enforcement is initiated. Transportation of waste shall be done regularly to ensure that no waste shall touch the ground in the collection point and to avoid Multiple and manual handling of waste .The frequency of transportation and the number of vehicles shall be arranged

accordingly. Such transportation should be done in compactor vehicles so that the waste in the vehicle is not visible or does not come in contact with the atmosphere, thereby polluting the environment.

(m) Provide Transfer Stations

As the distance to the processing sites are longer it would be ideally to establish transfer stations. It would be more economic instead of transferring the waste by the smaller vehicles over long distances. Waste collected would have to be transferred into larger transport vehicles before being taken to the processing site. Where it is essential, Waste Transfer Stations could be created. Such Transfer Stations should not be accessible to public Only the staff or the agency engaged for door to door waste collection, authorized group for waste recovery should be allowed to enter these transfer stations. The number and location of such Transfer Stations would have to be decided after a detailed planning based on the data about the aggregate waste generation, its location and optimizing the movement of door to door collection staff / vehicles. Such transfer stations should have a facility to empty the puchcarts / Auto tippers/ smaller vehicles into the bulk transport vehicles with minimum of handling Elevated platforms could be considered where feasible. Efforts shall be made by the BBMP to decentralize wet waste processing by providing bio-methanization units in each ward within a specific time period to reduce dependency on land fills and will bring down Municipal costs by eliminating the need to construct Transfer Points. (Specify time period and Phases in a Table)

(n) Containers to be placed where essential

Normally, only markets and other busy places shall be provided with community bins. Such container bins shall be of different colors for wet and dry waste and may have pictorial information of respective type of garbage that can be put into them. These bins shall have facility for being emptied directly into the vehicles without the waste being required to be re-handled. Container bin sizes shall be adequately provided , and shall be dependent on the area of the premises, volume of waste generated and the number of people using the premises, capable of storing one days waste without spilling over.

Facts and figures

- Estimated MSW generation Projection for 2012, from all sources for BBMP zones is ~ 4650 tpd
- Estimated waste generation from Residential House holds for BBMP area ~ 2511 tones per day (tpd).
- Per capita waste ~ 350 grams per day (gmpd) (domestic waste)
- Households contribute to ~ 54% percent of the total waste; Markets & function halls contribute to 20% and commercial establishment & institutions contribute to 17% and others 9%
- Segregation of waste at source 10%

The municipal waste generation (MSW) across all the zones are as under

Zone name	Generation of Municipal Solid Waste (per person /per day)
East	860
West	850
South	900
Mahadevapura	690
Yelhanka	300
Bommanahalli	410
R.R.Nagara	280
Dasarahalli	360

Advantages of Waste segregation at source and decentralized processing

Recycling and segregation of waste reduces the volume of waste that has to be handled. The costs of collection and transportation are thus reduced considerably.

- This also leads to a reduction in garbage reaching landfill sites and thus extends the life of existing landfill sites. In fact the land fill can go down to as much as 80% (thus a land fill for 125 years, instead of 25 years!) with proper segregation, recycling, and processing.
- Waste segregation and recycling lead to the saving of resources. It provides a supply of inexpensive industrial feed stock and thus reduces demand for energy, imported raw material, and thus a more sustainable development.
- These recycling activities provide income-earning opportunities to a vast number of urban poor in the city. Several thousands make a living from waste recycling process.
- The quality of compost/manure produced out of biodegradable waste segregated at source is far superior to that produced out of mixed garbage that is segregated at the processing site. In the latter case, lots of soil, road sweepings, etc finally end up as being part of the compost.
- Besides, processing sites handling mixed garbage tend to emanate stink. This is normally not the case where segregated waste is processed.

Plan of Action 3:

(a) Street Sweeping & Nuisance Detection

It is the duty of the BBMP to keep all the public places clean. Once the waste is collected directly from the generators, the road cleaning load would come down sharply. This shall not however, eliminate the need to carry out road sweeping regularly. All the roads are regularly swept. Depending upon the local conditions, roads in commercial areas may be swept twice a day. The staff shall provided with

proper equipment, hand carts, etc as also with safety materials such as gum boots, hand gloves, masks etc. The arterial and main roads where there is heavy traffic and are crowded during the daytime could be cleaned up at night by Mechanical sweepers.

a. The waste by sweeping the roads need to be collected using pushcart/wheeled bins into segregated form viz.,
    - Biodegradable waste
    - Dry Waste
    - Inert waste

b. The same shall be shifted to secondary storage / temporary storage point without mixing. The inert like silica / sand, plastics, fabrics, coconut chips, metals, rubber etc., collected during street sweeping to be grouped as non bio-degradable and hence should not be mixed with degradable organic waste. Similarly the vegetable waste, food waste thrown out by hotels, social functions, vegetable markets, animal waste etc., also should not be mixed with non degradable waste. The Bio degradable waste shall be transported using the Compactors, the dry waste will be sent to the Dry Waste Collection Centers and inert waste shall be transported using the closed tipper Lorries to the designated locations.

c. Cleaning of surface drains: collection of waste from clogged drains upto 0.6 mt depth including removing of obstacles under the covered drains in front of houses, removal of Manhole silt from the road side, uprooting of weeds alongside the road /street shall need to be undertaken by the street sweepers.

(b) Providing adequate number of Litter Bins

Though city is bin less, there is a necessity of small litter bins to be provided at crowded public places for people to get rid of waste conveniently, instead of just throwing it here and there unmindfully. The litter bins will be places in the commercial areas where necessary and clear during the time of street sweeping. All litter bins will be labeled – Dry Waste and Wet waste and efforts will be made to educate public on place waste in the right bins. These litter bins can only be used by the general public , commuters and is strictly not to be used by the commercial shops, residences on the street or by the street sweeping staff to dump the waste collected. In this case secondary segregation may be warranted till the public is educated completely about segregated waste streem.

(c) Effective Mechanism to Prevent Nuisance in Public Places

It is naïve to expect that all the citizens would give waste in the manner specified or segregate the same as soon as the BBMP notifies the need for doing so. It is observed that usually about 10 per cent of the population quickly understands the environmental and practical need for integrated waste management and hence starts cooperating. It is possible to convince another 30-40 per cent of the population over a period of time through proper and sustained awareness campaign and involvement of community. The balance would not budge unless shown a stick.

Once a minimum critical mass has been created it would be the right time to strictly enforce a penal system for erring citizens. A few instances of charging fine will force people to fall in line. In the case of door to door collection, the enforcement is best done through the Health inspectors, Environmental Officer of BBMP, private agencies / NGOs or whoever undertakes door to door collection. They should be given the right to collect fine for non-compliance with the rules of source segregation. For other public places, separate nuisance detection squads are essential. This squad could ideally be formed with exserviceman, ex-police staff, etc as nuisance detectors giving them a mandate to fine. A legal agreement can be entered into with each of them to avoid subsequent problems. Other alternative is to Routine checks by BBMP officials to ensures strict enforcement. They will be given powers to levy penalty on the spot. It is suggested that preprinted & numbered receipts of fixed denominations (of say Rs 10, 50 and 200) could be given to them. Only the name of the defaulting generators could be entered while issuing the same. The Policy also propose that the erring citizens may initially be given a warning slip if they do not give segregated garbage. More than two (or more) such slips in a week / month could lead to an actual fine being imposed.

A part / full remuneration of the squad members can be linked to the fines collected. For the scheme to be successful, each of the squads should consist of 2/3 persons & given an uniform and identity cards so that they are taken seriously. The members of the squad can be encouraged to carry a mobile phone. A vehicle can be taken on rent to give greater mobility to the squad/ supervisor. A close coordination with the city police would be useful so that the squad could register a FIR in case the erring citizens refuses to pay the administrative charge. The jurisdiction of the squads can be rotated once every 3 months to avoid complacency.

What you can do to reduce waste

- ✓ Carry your own cloth or jute bag when you go shopping.
- ✓ Say no to all plastic bags as far as possible.
- ✓ Reduce the use of paper bags also.
- ✓ Reuse the soft drinks poly-bottles for storing water.
- ✓ Segregate the waste in the house –keep two garbage bins and see to it that the biodegradable and the non-biodegradable is put into separate bins and dispose off separately/
- ✓ Dig a compost pit in your garden and put all the biodegradables into it.

- ✓ When you go out do not throw paper and other wrappings or even leftover food here and there, make sure that it is put in the correct place, that is into a dustbin.
- ✓ As far as possible try to sell all the recyclable items that are not required to the waste pickers.

Plan of Action 4:

(a) Scientific Processing & Landfill of waste

As per the Municipal Solid Waste (Management and Handling) Rules 2000, the Municipal Bodies are responsible for processing of waste and only rejects (and hazardous waste) are to be sent for landfill site. Efforts are made by BBMP to establish the processing and Landfill facilities. However with the increase quantum of waste the facilities are overburden.

(b) Processing of waste before land filling

1.4.3 The waste needs to be processed before land filling. Landfilling should be restricted to inerts ,this is mandated by law, and imperative for sustainable urban waste management. Also all the processing facility needs to have material recovery centre to recover the recyclable. As it cannot expected 100% segregation at the source. Some Various technologies like waste to energy RDF, Pyrolysis, etc shall be used to process only the composting rejects and non recyclable wastes . The processing of waste becomes simpler in case segregated waste is obtained.. The processing of waste becomes simpler in case segregated waste is obtained. This is possible through all the steps enumerated so far, i.e. separate collection & transportation of bulk waste, debris not getting mixed up in municipal waste and finally house to house collection of segregated bio-degradable waste, with recyclables being sold locally.

Another precaution that needs to be taken is not to use any type of pesticide at the processing site. The waste can be rendered non-polluting by simple sanitizing /stabilizing - the first step in composting through inoculating the waste with cow dung solution or bio-cultures and placing it in wind-rows (long heaps) which are turned at least once or twice over a period of 45 to 60 days. The waste can be sprayed with chemicals that speed up decomposition, or promote growth of culture. This ensures that the final product is useful as a green manure and can be used by farmers. Under no circumstances, the waste can be burnt or incinerated.

(c) Decentralized smaller plants

A large portion of the municipal budget on SWM is spent on transporting the waste to the Processing facilities. This consumes huge quantity of fuel, man-hours, and contributes to degradation of fragile city environment. Moreover, the transportation of MSW from individual wards to the landfill site itself burdens the already critical road transport network in these cities. Considering heavy expenditure on transportation of

solid waste, it is imperative to adopt a decentralized Approach. Under this where the land is a available 2 to 3 contiguous wards or a single ward in city need to be clubbed into viable blocks of the required size. While door to-door collection and segregation is organized in each of the wards, the segregated organic waste would be transported to the treatment plant located in the block itself. This decentralized plants are able to substantially reduce transportation costs as well as reduce the amount of waste reaching the land fill site.

- 'SHOWS' an Residential welfare Association as taken an initative at Dollars colony for segregation of the waste at source and process the waste by composting.
- Kalyan Nagara Residential welfare Association is also segregating the waste at source and has given rights to one NGO to take away waste after segregation and sells dry waste and makes compost out of wet waste.
- Organic waste convertor installed at Malleshwaram and Jayanagara are used to convert one ton of green waste to compost.

The decentralized system offers many benefits to the city administration. Some of the major ones are cited below:

- ✓ Reduced load on the transport system as only 40% of the material has to be transported over long distances.
- ✓ The distance travelled by the rest of the waste will only be a small fraction. This would reduce expenses on fuel by almost 60% and also result in lesser air pollution.
- ✓ Another advantage of the decentralized approach is that it is modular in nature and can easily be implemented in stages. This also avoids problems due to putting all eggs in one basket.
- ✓ The waste treatment projects being of smaller size, become manageable, and result in better value creation. The marketability of the produce is improved when multiple technologies produce different products.
- ✓ The organic manure, both by bio-methanation as well as composting, will be of better quality.
- ✓ Increased life of land fill as only a small portion of waste has to be land filled.
- ✓ Income generation for NGO's and rag pickers. The health standards for this segment could also be improved.

(d) To Create Proper and adequate Land Fill Site

With the rapid increase of population , the quantum of waste generation will also increases enormously. The present processing sites will last in another 10-15 years or so Keeping in view the future plans for processing and disposal of waste an alternative site is to be located for the next 25/ 30 years. The Rules stipulate how such site should be selected. Before acquiring new lands for landfill, its local groundwater and environmental survey should be done. Care is to be taken that the site is away from habitation clusters, forest, water bodies, monuments, wet lands and places of important cultural, historical and religious aspects. It is also essential to get a clearance from the

Karnataka state Pollution Control Board (KSPCB) before putting the land fill site into operation.

(e) Facilities at landfill sites

The Present landfill site has to be developed into a sanitary landfill site. It should be serviced through proper infrastructure like internal roads, water, electricity and facilities for employees to bathe. It is required to have a weighbridge and a sorting area. (In the initial period 100% waste do not get segregated). The site is to have facilities for fighting fire. The site is also required to have proper facilities for collecting the leachate from the waste during processing so that it does not contaminate the ground water. The ground water as well as the air quality has to be frequently checked to ensure that no such contamination / pollution are indeed taking place. The landfill site must be enclosed and trees must be planted all around. It is important to demarcate the area around the new sites as a buffer zone to prevent new development around it. This must be done at the earliest, and certainly before the site becomes operational, in order to avoid conflict at a later stage. The Rules prescribe that the rejects should be layered with inert material Debris can be used as an alternate to the soil cover. The whole process of scientific landfill should be properly monitored by BBMP.

Composting Technologies

Organic matter constitutes 35-40% of the municipal solid waste generated in India. Composting is the controlled decomposition of complex organic materials by microorganisms such as fungi and bacteria that convert degradable organic waste into humus like substance. This finished product, which looks like soil, is high in carbon and nitrogen and is an excellent medium for growing plants. Apart from being clean, cheap, and safe, composting can significantly reduce the amount of disposable garbage. The organic fertilizer can be used instead of chemical fertilizers and is better specially when used for vegetables. It increases the soil's ability hold water and makes the soil easier to cultivate. It helps the soil retain more of the plant nutrients. Although decomposition occurs naturally, composting facilities are designed to speed the rate of biological decomposition by managing key parameters, including moisture content, oxygen, temperature, and the ratio of carbon to nitrogen.

Aerobic Composting employs oxygen as part of the decomposition process. Composting facilities use two basic methods to introduce air.

Windrow systems: This type of facility is where material is composted in long piles (windrows) on a flat site. Windrows are kept porous mechanically by turning zzthe material periodically. If piles are not turned often enough, the center of the pile may not receive enough oxygen, producing strong, unpleasant odors.

Aerated static pile systems: In this type, air is introduced into a large pile through air duct systems installed beneath the base of the pile. Aeration can be positive, blowing up through the pile; or negative, drawing air down through the pile. Negative aeration has the added capability of exhausting the processed air through odor

scrubber systems when necessary. In general, aerated static pile systems have higher capital costs but lower overall operating costs than windrow systems.

A turned-aerated pile systems combine both of the above technologies for more consistent process control and product quality.

Vermi composting: This uses worms to achieve controlled composting of organic wastes. Worms digest organic materials. In addition to significantly reducing the quantity of waste material, the end product can be used as an organic fertilizer. Compared to other composts, this has a finer texture, do a better job of enhancing the soil, have typically higher levels of nitrogen, potassium and phosphorous, and have more microorganisms to fight diseases in plants.

Anaerobic digestion: This is a biological process that occurs in the absence of oxygen. Anaerobic processes can either occur naturally or in a controlled environment. The organic waste is put in an airtight container called a digester where decomposition begins and the biogas is captured and sold for electricity.

The residue can be used as a fertilizer similar to compost.

Green waste composting: Green waste consists of leaves, brush, tree trimmings, grass, garden waste, shrubs and materials generated by nurseries, public gardens, and individual citizens. Green waste usually does not require much preprocessing to remove contaminants. Only impurities such as plastic bags, wire or rope may be removed by hand. Reducing the size of brush and tree trimmings facilitates handling and speeds the composting process. In addition, the harder, more uniform wood also help aerate the piles, thereby enhancing decomposition. The composting process can be further enhanced if leaves are also pre-shredded. The nutrient level in green waste is generally high and it is marketed easily.

Mixed solid waste (MSW) composting: Paper, food scraps and green waste make up the compostable portion of the mixed municipal solid waste. However, mixed waste also includes nonbiodegradable items such as plastics and metals. The quality of the compost product will depend on the degree to which noncompostable items are removed in the process. Generally, separating contaminants early in the process results in higher quality compost. Material Recovery Facilities allow us to process mixed municipal solid waste to recover recyclable materials. This is done in various ways. The simplest consists of conveyors systems from which useful material is picked up through manual labor. More sophisticated facilities use shredders, conveyors, screens,and magnets to separate components of the waste. Some facilities also use devices that use forced air to separate the light burnable fraction from the remaining inert material. Computerized equipment is sometimes used to recover and segregate aluminum, paper, glass, and plastic. These are all expensive. The best solution is to get segregated waste for processing. Composting technologies have an added advantage of producing fertilizers which can be conveniently sold to nearby

rural areas. The composting technologies can create large scale employment in the urban areas, without putting any financial burden on the city administration.

Waste-to-Energy technologies

Waste-to-energy (WTE) facilities dispose solid waste or recover energy through mass burning, refuse-derived fuel incineration, pyrolysis, or any other means of using the heat of combustion. A volume reduction of 90 percent is typical for these facilities; the unburned waste fraction (ash) continues to require landfill disposal or may, in certain circumstances, be recycled into useful products such as bricks or concrete. The energy generated can be used to offset the initial capital and operating costs of a waste to- energy facility. The three general types of waste-to-energy facilities include mass burn incinerators, refuse derived fuel facilities, and pyrolysis facilities. Mass burn incinerators: Mass burn incinerators burn mixed municipal solid waste at very high temperatures with limited preprocessing. In some cases, additional preprocessing is added to remove materials for recycling or other materials that may cause ash contamination, damage equipment, or contribute to toxic air emissions. To control temperature, air is allowed to enter the combustion chamber at a volume and rate significantly greater than that needed for combustion (excess air). Most incinerators produce steam, which is then used either for heating, industrial processes, or electricity generation.

RDF facilities: Refuse derived fuel (RDF) facilities process solid waste into a relatively homogeneous fuel with a uniform particle size and defined moisture content, suitable for burning in conventional boiler systems. A typical plant would have an extensive system for material recovery. An unusable fraction is disposed at a landfill. RDF can be prepared as shredded fluff or compressed pellets. After processing, RDF is typically burned in a dedicated combustion unit directly affiliated with the processing area, or sold to an electric utility or an industrial customer.

Pyrolysis: Pyrolysis is the process of decomposing materials with heat in an oxygen-deficient atmosphere. In a pyrolytic gasification facility, waste would be preprocessed to remove materials, such as metals, that cannot be decomposed. The waste would then be dried and transported to a chamber where it would be exposed to radiant heat tubes in an oxygen-free atmosphere. The heat reduces the waste into basic components: gases, (methane, ethane, hydrogen, and carbon monoxide); liquids (oil and tar); and solids (char and carbon black). The gases can be cleaned and used as a fuel for other purposes or transferred back to the chamber where it would be used to heat the radiant tubes. Solid residues are land-filled. There is reason to believe that pyrolysis can provide more complete combustion than mass burn or RDF technologies. More complete combustion reduces the levels of some pollutants in emissions from the facility. The main uncertainty of pyrolysis for handling municipal solid waste is that economic and technical feasibility have not yet been demonstrated on a full-scale commercial basis. More development is needed to make this technology commercially viable.

Conclusion

All incineration based technologies are capital intensive and also costly to operate. In addition concerns about emission control, ash disposal, long term regulatory issues, have not been fully addressed. During the process some of the ash floats out with the hot air. This is called fly ash. Both the fly ash and the ash that is left in the furnace after burning have high concentrations of dangerous toxins such as dioxins and heavy metals. Disposing of this ash is a problem. The ash that is buried at the landfills leaches the area and cause severe contamination. Burning garbage is not a clean process as it produces tons of toxic ash and pollutes the air and water. A large amount of the waste that is burnt here can be recovered and recycled. In fact, at present, incineration is kept as the last resort and is used mainly for treating the infectious waste. In addition, the quality of municipal waste of a typical Indian city make them less suitable for disposal by incineration as compared to other simpler composting technologies.

5. RESPONSIBILITY OF BBMP TOWARDS PLASTIC WASTE, BIO MEDICAL WASTE, HAZARDOUS WASTE AND E-WASTE RULES

a. Plastic Waste Management:

Facilitate setting up of a Common Facility for plastic waste recycle

Not all types of plastics are reusable after recycling. Also recycling is not always an economically viable proposition and thus such plastic material ultimately gets dumped causing environmental hazards. Also it causes undesirable situations Recycling is at best the second option. The first priority should be not to produce this sort of material at all and find eco-friendly alternatives. Presently we see the user as the generators of waste. A product goes to the user and the user generates the waste The ULB collects and landfills it, thus destroying the precious natural resources.

In the US and Europe, producers are required to take back the waste for feeding back into the production cycle. Many producers have found that instead of this, it is simply better to design product differently. Thus in this Extended Producers' Responsibility (EPR), the responsibility for waste reduction shifts from the government and the users, back to the producer.

The focus is not what governments and user must do, but what manufacturing companies should do. The implications are that EPR encourages pollution prevention; reduces resource and energy loss in product lifecycle and changes product designs and processes. All over the world EPR is fundamental to the waste policy, while India has not looked at this option. In India we have for ages used disposable leaf plates (not paper) for eating food. Reusable bottles for cold drinks and milk was our traditions that we are fast forgetting and are now being replaced by poly-packs and pet bottles. Use of earthen containers for serving tea and coffee (rather than plastic or paper cups) was our year-old practice.

The household "Waste Pickers" is a familiar site in all our cities (without being given any incentives by way of licenses, or reduced property tax by the Municipal body) and does service by recycling tons of garbage which would have otherwise been sent to the dumping ground. Waste management should not merely revolve around collection, transportation and disposal of waste once it is generated and even segregated. In fact the need of the hour is sustainable waste reduction through controlling the products that create waste.

As per the MoEF notification BBMP has banned the use of plastics carry bags less than 40 microns from 15-3-2011.In order to reduce the usage of plastic, BBMP has fixed the rates for sale of plastic carry bags. Small quantity of Waste Plastic are segregated and used in the construction of pavement roads. In order to reduce the menace of plastic, conversion of plastics to crude oil technology has been proposed on DBOT basis. About 775 lt of crude oil is produced with 200 to 400 tons of plastic waste. Modalities need to work out on Extended Producer's Responsibility involving such manufacturers and brand owners registered in BBMP jurisdiction as explained above for setting up collection system for the plastic waste.

b**. Biomedical Waste Management:**

As per the Bio-Medical Waste (Management & Handling) Rules 1998 it is the duty of the biomedical waste generators to segregate, store, transport, process and manage the biomedical waste without any adverse effect to human health and the environment. One or more common facilities for the city through private operators is an optimal solution. Presently the bio medical waste is handed over to a private agency M/s Semb Ramky authorised by KSPCB, for the medical community under the jurisdiction of BBMP. For the other Hospitals or the medical community in the city BBMP has to compel the generators to avail this facility unless they have set up their own facility. This can be done while granting registration to the medical practitioners and to nursing homes and hospitals. The medical waste generated at the household level like the used syringes soiled cotton etc need to handover to the nearest BBMP dispensaries or the hospital free of cost where as if handed over to the private Nursing homes or hospitals a prescribed fee need to be paid by the households for safe disposal. Also the expired medicines in the homes need to be handed over to nearest medical shop/ pharmaceuticals who will in turn send it to the Manufacturer.

c. Hazardous and e -waste Management:

The Industries need to manage the hazardous waste generated by them by handing it to the authorised agencies like M/S Ramky. The e-waste and the hazardous waste generated at the households like old batteries, shoe polish, paint tins, cds , floppy etc need to be handed over along with the dry waste to the door to door waste collector as specified by BBMP. At the dry waste center the e waste shall be handed over to the e waste recycler authorised by KSPCB.

6 THE IMPLEMENTATION PLAN

The implementations of the Action Points have to be guided by some Touch Stone Principles. Unless these are followed, the desired results of keeping the city clean and free from garbage cannot be achieved. These principles specify the "HOW" of managing the waste. Five Touch Stone Principles have been identified. These include the following:

1 Involving the community and other stake holders (political leaders, employees, contractors etc)
2 Work out a detailed plan for implementation of the SWM Rules.
3 Put in place a financially sustainable system to handle waste.
4 Create right and dedicated administrative machinery.
5 Set targets and monitor them regularly.

Touch Stone Principle
1: Involving the community / Stakeholders

The efficient solid waste management is not possible without the active participation of the people. Whenever a new system is to be implemented, or where the existing habits of citizens are to be modified, it has to be supported by very active community participation. The MSW Rules, 2000 stipulate extensive involvement of the community.

It is important to realize that effective Solid Waste Management depends, as much upon co-operation between waste generators, community, recyclers and informal workers, service providers etc on the one hand, and the regulators, the elected representatives and the BBMP on the other hand, as it does upon purchase of vehicles, bins, providing manpower, application of appropriate technical solutions, etc. The following need to be emphasized during awareness creation:

- People need to be educated about segregation into dry and wet waste; storing it at source (in their houses or in the housing complex) and handing it over to the door-to-door collection vehicles or transferring it into containers (in market area) bins.
- They should be made aware about the necessity of segregating the waste before handing it over to the waste collector.
- People need to be encouraged not to litter roads and public places.
- The importance of processing of wet waste into useful manure in a decentralized manner, using means like vermi-composting, etc needs to be emphasized.
- People need to be educated about the 3R's – Reduce, Recycle and Reuse, to ease the pressure on waste management.

The Community has to be made aware that they cannot dispose off their garbage in a manner they want. Once adequate awareness has been created, this can be followed by strict enforcement of byelaws, whi need to be adopted for this purpose.

(a) Means of awareness creation

Dedicated participation of elected and administrative wings is crucial to educate people about keeping the city clean. Involvement of senior citizens and respected and popular members of the community would certainly help. Involvement of various groups of people, like resident associations, trade associations, shopkeepers associations, youth groups, NGOs, CBOs, religious groups, institutions like schools and colleges, etc is also essential. Special emphasis needs to be given to involvement of housewives, maid servants, watchmen of housing societies, sweeping staff, etc while creating awareness. Conducting regular meetings, workshops, group discussions and rallies, street plays, competitions, essay writing, drawing competitions, etc are seen to be very effective. Mass awareness shall also be created through public notices, sponsored advertisements in local newspapers, theatre halls, cable TV and such other mediums. Innovative system to create awareness amongst tourists, school children and local people by organizing shows in various tourist spots like cubbon park, Baneerghat national parks, etc. for stopping littering of waste.

Localized awareness creation is seen to be most efficient. For this, ward based committees of voluntary and social organizations, youth groups, senior citizens, etc could be formed. These committees may be encouraged to make plans suited to local conditions and be empowered to enforce its implementation. They can be encouraged to take up other public issues like water supply, sewerage, sanitation, etc with the ward authorities. The involvement of an intermediary, by way of a Non Governmental Organization will be useful. NGOs could help in creating awareness and for the effective propagation of the new methodology. Another important means of creating awareness is to educate the school children about keeping their households and area clean. School children are the best messengers for spreading awareness among their parents.

In order to educate the community and bring awareness regarding the modern practices of solid waste management practices, IEC plays an important part IEC programme has been taken up for a period of one year and will be continued for other two years for sustainability. BBMP has allocated its resources to initiate IEC in the city that will help shred the old practice of dumping un segregated waste and inculcate practices of sustainable methods of waste handling that includes segregation and decentralized waste processing and management. There will be a focus how an individual can contribute and their obligation and duty – Kartavya.

It has to be kept in mind that awareness creation is a time consuming process and needs consistent follow up. The awareness drive must go on till the people are habituated to follow the right systems of managing the waste. Unless and until, a

continuous movement for awareness creation takes place, the dream of clean and beautiful city cannot be realized. In order to sustain the awareness drive, steps to encourage those who make early efforts to maintain cleanliness in their areas should be taken. Office bearers, citizens, employees should be publicly felicitated for the commendable work done by them. Similarly, awarding or felicitating the citizens, in public for efforts to keep their localities clean, are some of the ways to encourage public participation. (Adoption of the Recyclathon Awards by the BBMP and the KSPCB can be considered for long term recognition)

2: Zone wise Plan for scientific Waste Management

Just as a development plan is needed for systematic growth of cities, planning is required for ensuring regular cleanliness in the city. This action plan has to go substantially beyond acquisition of a landfill site, purchase of vehicles and litter bins, employing more staff, and constructing facilities to process and landfill waste. What is required is a detailed plan that would comprehensively and optimally manage each type of waste producer, as well as each type of waste generated in the city.

The plan can be prepared in two parts. The first is a macro plan (see box) which identifies the quantum of waste generated in the zone and the broad strategy to be adopted to manage the same. This is followed by a micro or locality wise plan (see box) which details out the route, timing, equipment and manpower, and how they are to be deployed. The plan shall be prepared in-house by the implementation officers. The zonal officers need to prepare the Action plan as per the template in **Appendix 4**

(a) Involvement of People while preparing the Plan

Involvement of local Corporators and MLAs, local public (youth organizations, resident welfare associations, NGOs, CBOs, etc) is important for ensuring smooth implementation of the plan. Approval of plan from such varied groups shall not only help in bringing innovative ideas but also help in creating a sense of belonging, responsibility and awareness among them to keep the city clean.

3: SWM Activity must be financially sustainable. Levy of User Charges

It is known that the management of solid waste management is the statutory and most basic responsibility and cannot shirk from this responsibility for the reasons of financial limitations. Also since this obligatory duty has to go on indefinitely, it has to be a self supporting, or low cost activity. It should operate on business principles. It must be remembered that SWM Management is a long term activity. Waste shall not only be generated in the city till it has residents, but the quantum shall increase with time and as the purchasing power of its residents increases over time. Therefore this

activity has to be financially viable in the long run.

Levy of user charges is therefore an essential requirement and it is already started by collecting user charges through property tax. It is essential that a charge be recovered from all categories of waste producers. The concept of payment of user charges by each waste generator against ensured service delivery would help in the direct involvement of the citizens and also help in attaining a self-monitoring system of solid waste collection and also reduce the financial burden of BBMP. This will also ensure the accountability of the service provider. The present user charges slab fixed need to be revised. Also it is to bring all the waste generators (households, commercial establishments, institutions) under the property tax.

In the year 2001 the KMC Act was amended to introduce collection of SWM cess from all the households and commercial establishments under the section 103(B) the following cess has been fixed for the various establishments, from the year 2011-12 the SWM cess is being collected through property tax.

I. Residential Buildings:-

1. Plinth area less than 1000 sq.ft.	Rs. 10
2. Plinth area not less than 1000 sq. ft. and not more than 3000 sq.ft.	Rs. 30
3. Plinth area exceeding 3000 sq.ft.	Rs. 50

II. Commercial Buildings:-

1. Plinth area less than 1000 sq.ft.	Rs. 50
2. Plinth area not less than 1000 sq. ft. and not more than 5000 sq.ft.	Rs. 100
3. Plinth area exceeding 5000 sq.ft.	Rs. 200

III. Industrial Buildings:-

1. Plinth area less than 1000 sq.ft.	Rs. 100
2. Plinth area not less than 1000 sq. ft. and not more than 5000 sq.ft.	Rs. 200
3. Plinth area exceeding 5000 sq.ft.	Rs. 300

IV. Hotels, Kalyananamantaps, Nursing Homes:-

1. Plinth area less than 1000 sq.ft.	Rs. 300
2. Plinth area not less than 1000 sq. ft. and not more than 5000 sq.ft.	Rs. 500
3. Plinth area exceeding 5000 sq.ft.	Rs. 600

Also under the 13th Finance Commission 200cr has been earmarked for Solid Waste Management, for the period of four years. This grants will also be used for better management of SWM

Macro plan

Municipal Solid Waste (Management & Handling) Rules 2000 broadly lay down the parameters for the management of municipal solid waste. This includes house to house collection, segregation, storage, transportation, processing and landfill of the waste. The action plan must be prepared to lay down a system that can be implemented in a sustained manner and that takes into account each of these activities, preferably for each type of waste, and also class of waste generators. This plan must be cost effective and be one a city can afford. Finally this plan must have target deadlines to implement the same.

The macro plan should start with the identification of various classes of waste producers and must attempt to tackle the bulk producers separately. A separate mechanism can be planned to collect and landfill debris and construction waste. The residential areas may have to be classified into societies (collection through large vehicles), slums (handcarts) and individual households (small vehicles/autos) and tackled differently. The way dry waste is to be accepted can also be prescribed i.e. once a week, A series of Dry Waste Collection Centres can also be planned to facilitate localized management of dry waste.

Transportation mechanism must match the collection as well as the extent of segregation prescribed. It must also ensure minimum multiple handling of waste. Where direct transportation from the household to the processing site is not possible, intermediate Transfer Stations may be planned. The plan would also consider methodology for waste processing and also to landfill residue left after processing. Methods to encourage decentralized waste processing need to be considered at this stage.

It would also be necessary to decide how much charge should be levied for waste collection For bulk waste and debris generators the charges could be proportionate to the waste generated.

Micro-plan

Based on the Macro Plan, ward wise planning would have to be undertaken. This would contain ward wise and road wise details of the resources needed to implement

the plan. It would have to take into account the number of residential and commercial properties and an estimate of the quantity and kind of waste generated. The time schedule of door to door waste collection would also have to be drawn. The locations for secondary point for transfer of waste from the primary vehicles shall be planned. Plan should include decentralized management of waste through projects like composting, bio metanization etc

The micro plan should also work out a strategy for awareness creation. A list of all NGOs, schools, colleges, social organizations etc within each ward that can be approached for cooperation during awareness campaigns can be prepared. Micro plan should include role of school/college students in convincing people about the importance of segregating waste into wet and dry garbage at household level

4: Proper Administrative structure to be placed

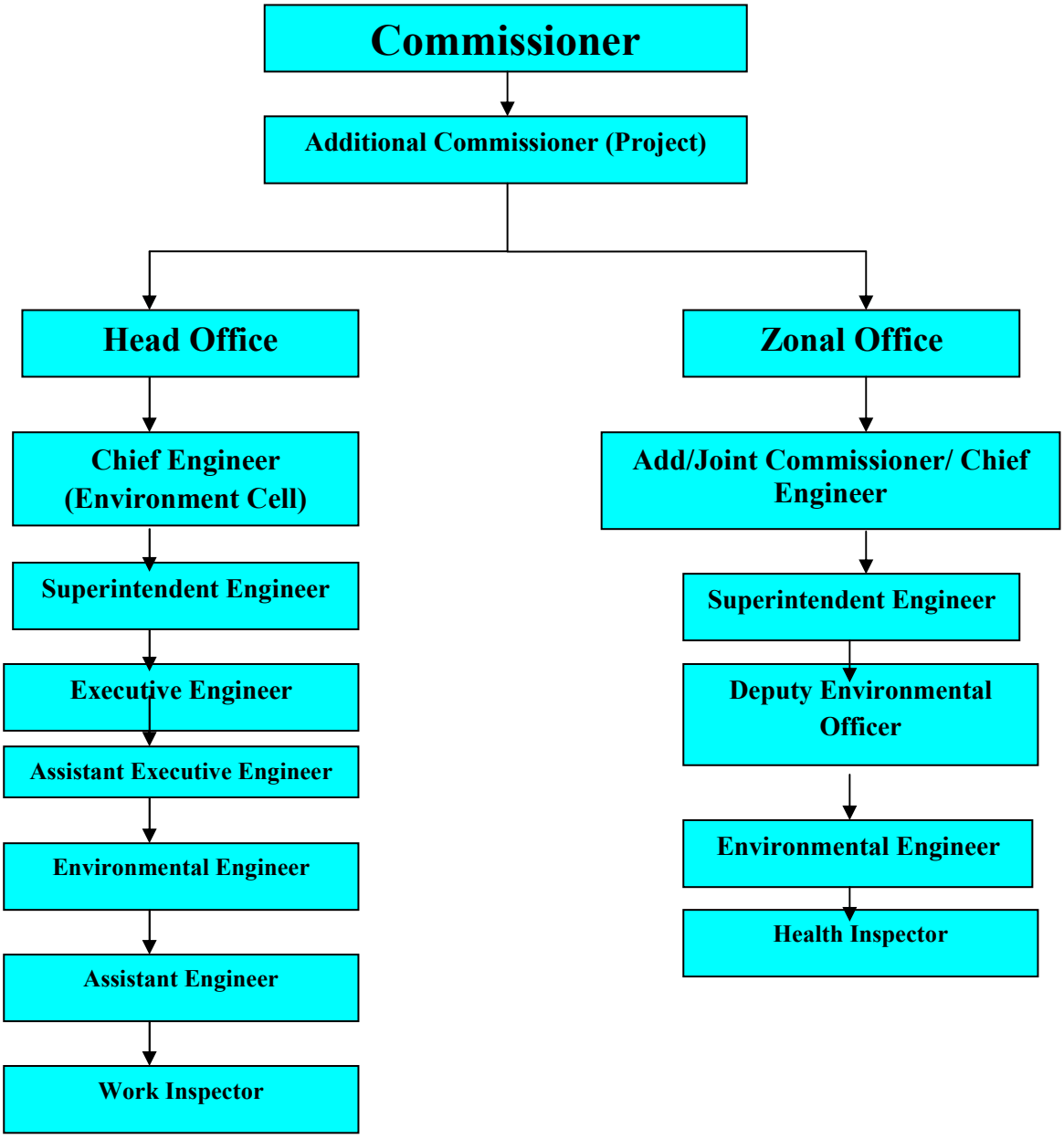
One of the major problems faced by BBMP is the lack of staff trained to handle municipal waste scientifically. Even separate department exists to handle this activity sufficient managerial staff needs for effective solid waste management. Wherever successful implementation of the solid waste management rules has been achieved so far is due to the extraordinary championship of the chief executive. These efforts soon disappear as soon as the "champion" is transferred. The problems of the right staff for consistently handling this important municipal activity has not been quite well addressed. What is required for city is a solid waste management cell consisting of a trained environment engineers, a dedicated officer exclusively dealing with this subject.

This cell has to have expertise to put in place the right systems, to obtain the right community involvement through public education and participation, to enter into necessary public private partnerships, to monitor the effective functioning of these agencies, and finally constantly fine tuning of the strategy and repeating the entire chain of activities.

A dedicated staff expertise in the subject like Environmental Engineer for every sub division is required to monitor the day to day activity of SWM. While initially, they can be taken on contract basis, the in-house expertise has to be build up, sooner rather than later. Such capability would also be required for day to day monitoring of the activity on a sustained basis. Finally, the administrative staff, or the workers of an agency where one is engaged, also needs to be properly oriented to the new way of handling waste, explaining to them the advantages of segregation. The staff needs to get over their old mindset and get motivated to function diligently. A drive for

segregation would not be effective if the sweeping staff is not properly equipped, trained and sufficiently motivated to perform their assigned duties. The officers appointed for SWM activity shall be given an extensive orientation program in assistance with local NGO/ certified by The State Institute for Urban Development (**SIUD**), **Mysore** before commencing his/her job. A training manual shall be prepared for the same.

The staffing pattern for the cell is as below



Principle 5: Targets and monitoring mechanism

What gets monitored gets done. Nothing could be truer for an activity which is not glamorous, as is the case with municipal solid waste. It is therefore essential that clearly identifiable targets are laid down for each of the action points that arise out of the plan prepared. Once this has been done, clearly identifiable sub-goals with specific target dates to achieve the overall goals have to be laid down. Such targets would have to be for specific activities that need to be undertaken.

BBMP will provide adequate infrastructure facilities to assist citizen compliance with this policy. In addition to waste collection services, litter bins, conveniently located community storage centres, dry waste sorting centres, and composting centres will be set up, wherever possible and essential, in consultation with local citizens. Adequate community toilet and washing facilities will be provided in slum localities with the participation of the local community based organisations or Local Area Citizens Groups to prevent nuisances such as squatting, washing and urinating on public roads.

BBMP will release publicly, the monthly data about the and quantity of each category of waste going to the sorting/ decentralised composting units and different waste processing and landfills sites. Such information will be available at the Ward Office and on BBMP website.

Formation of Technical Committee (TC) :

A Technical committee shall be formed comprising of the Chief Engineer, Executive Engineer (Head office), Zonal Technical SWM heads and two SWM experts from other organization like KSPCB/IISC/KUIDFC/DMA and two representatives from NGOs/Institutions will be the member and Environmental Engineer as a convener under the Chairmanship of Additional Commissioner (Projects). The Committee will issue all the Technical guidelines and recommendation to execute the SWM policy.

The Technical Committee shall meet once in two weeks and sometimes as and when required. The proceedings shall will be circulate to all the members and will be responsible to initiate actions as per the recommendation prior to the approval by the Chairman.

Monitor Committee

A Monitoring Committee shall be set up, to review, to provide a redressal mechanism and to compliance with MSW rules 2000 periodically the operations, on decentralized plants and the processing & landfill sites. The monitoring committee shall comprise the Technical team from BBMP and the experts from the outside.

Service Level Benchmark(SLB)

Ministry of Urban Development has initiated an exercise to define Service Level Benchmarks (SLBs). MoUD constituted a 'Core Group for SLBs', comprising experts from various institutions to arrive at the SLBs. Drawing on the experiences of various initiatives in measuring service level performance, the Core Group narrowed down the exercise to four basic urban services to begin with, and arrived at sets of indicators in each.

Service level performance parameters have been identified for four basic urban services, viz.

a) Water Supply

b) Sewerage

c) Solid Waste Management

d) Storm Water Drainage

Under Solid Waste Management the following indicators have been identified and required to comply the standard Benchmark value .

Performance Indicators	Bench Mark Value in %
Household level coverage of Solid Waste Management services	100
Efficiency of collection of municipal solid waste	100
Extent of segregation of municipal solid waste	100
Extent of municipal solid waste recovered	80
Extent of scientific disposal of municipal solid waste	100
Extent of cost recovery in Solid Waste Management services	100
Efficiency in redressal of customer complaints	80
Efficiency in collection of SWM related user related charges	90

In order to achieve the above target , needs to put in place an effective system for performance reporting by all wards and Zones and Environmental cell will monitor

the action plan and targets achieved . The Additional Commissioners along with the Chief Engineer play an important role in monitoring the implementation of the policy.

Targets set for implementation of the policy

Targets	**Benchmark**	**2012-13 in percentage**	**2013-14 in percentage**	**2014-15 in percentage**	**2015-16 in percentage**
Source segregation	100%	50	70	90	100
door to door collection	100%	90	100	-	-
Setting up of Dry waste collection centres	198 Nos	40	70	90	100
Bulk waste management (ll choultries, Hotels, Markets Public office and corporate campuses, Malls, Tech parks, Schools and institututions with more than 1000 students , Apartments with the more than 100 units shall process the waste in their own premises)	100%	10	40	60	100
User fees collection	100%	30	50	80	100
Reduction of the waste going to landfill site getting landfilled after processing	100%	20	30	50	80

Integration of informal workers in SWM activity	50%	20	30	40	50

MIS and Complaints:

The Chief Engineer, in consultation with the Zonal Heads will prepare the MIS and upgrade the existing Online PGR (Public Griverence Redressal)System or suitably design a new one as part of the proposed Citizens' Portal to integrate the systems required for the implementation of these Rules. Statistics of complaints and Action Taken Reports shall be displayed in the PGR / Citizens' Portal

Roles & Responsibility of the officers

Head Office level

Chief Engineer (Environment Cell)

Chief Engineer will be the head of the overall solid waste activity from collection to disposal. C.E will be technical committee head for issuing of guidelines and orders regarding SWM. C.E will be the one point contact for SWM activity. C.E will be assisted with a Superintendent Engineer & a Technical Assistant.

Executive Engineers

At the head office level two Executive Engineer will be placed. They will be in charge of bring in more technology for processing of MSW & landfill establishment of landfill sites. They will be directly assisted with A.E.E's/A.E's/J.E's/work Inspectors and will be reporting to Superintendent Engineer and Chief Engineer,

Zonal level

Superintendent Engineer (Env.Officers)

Superintendent Engineer will be full incharge of SWM activity starting from collection to disposal of MSW to the processing site at the zonal level. S.E will be responsible for preparing the action plan for the zone as mentioned in the policy in assistance of D.E.Os and E.Os. for implementation of SWM policy at the zone level. He will be one point contact for the SWM activity at the zonal level. For administrative approval S.E will reporting zonal Joint Commissioners and for Technical Chief Engineer

(Environment Cell). S.E will be assisted with the Deputy Environmental Officers, Environmental Officers and Health Inspectors.

Deputy Env.Officers (D.E.O)

Each division of the zone with A.E.E cadre will be in charge of D.E.O. D.E.O shall implement the policy in division level and monitor the daily activity. He will be responsible for setting up the Dry waste collection centers (DWCC), Organic waste converter (OWC) & other decentralized plants. He must ensure that waste is collected from all the generator and it transport to the respective processing center without any accumulation on the road. Enforcement power will be given to implement the policy in effective way. D.E.O will be assisted with Environmental Officers.

Environmental Officers.

At the sub division level an Environmental Engineer/Assistant Engineer cadre will be in charge of the SWM activity. Environmental Officer shall look after all the activities starting from source segregation to the disposal. Environmental Officer shall conduct the awareness program about the waste management to the local residents, hotel associations, contractors and pourakarmikas. Environmental Officer shall coordinate with the local NGOs, RWAs, Schools & Colleges and Institutions to implement the policy. Enforcement power will be delegated to the Environmental Officers for effective implementation. Health Inspectors will be assisting Environmental officers.

Time Schedule for Implementing of Daily Work

The daily and weekly time schedules and routes of BBMP's collection of different types of Municipal Solid Waste such as i) biodegradable, ii) recyclable and non-recyclable (dry), iii) E-Waste, will be fixed and notified in advance by the BBMP. Details will be available at all Ward Offices and on the BBMP website.

Sl. No.	Activity	Time Schedule
1	Door to Door collection of wet waste from Various House holds daily	6.30 AM to 11. 30 AM
2	Door to Door collection of dryWaste from Various House holds	First Sunday of every month 6.30 AM to 11. 30 AM
3	Street Sweeping and Drain cleaning	

	i. Lanes /Conservancy, Regular Road and Sub-Arterial, markets, other than specified. ii. Footpaths, open grounds, public places, government building surrounding, open areas, and removal of silt in roadside drains, Mouth of shoulder drains, L & U shaped drains shall be cleaned / swept during day time.	6.30AM to 2.30 PM
4	Burial ground, play ground and electrical crematorium	6.00AM to 2.00PM
5	Major Market	6.00AM to 2.00PM and 2.00PM to 10.00 PM
6	Night sweeping for Arterial/ Markets /Bus routes and commercial roads (excluded from Mechanical sweeping package)	10.00PM to 6.00AM
7	Collection of e-waste from households and establishments	Last day of every month, As per the time schedule proposed by the BBMP officials
8	Collection of Bulk waste generated at households and establishments.	Once in every 3 months, As per the time schedule proposed by the BBMP officials
9	Transportation of MSW to Dry waste collection center/ segregation point and or processing /landfill site	As per the time schedule proposed by the BBMP officials

Review:

Commissioner, BBMP will review the effective implementation of these Rules, once in a week, and take appropriate steps to ensure course correction such as evaluation of BBMP's achievements against targets; BBMP's support to citizen response and participation; revision of Fines, etc.

7 INVOLVEMENT OF THE PRIVATE SECTOR

Involvement of the private sector is essential for the effective implementation of the Municipal Solid Waste Management Rules 2000 and the Plastic waste rules 2011. This is particularly so since the local ULBs have both financial and technical limitations to do so on their own. Participation of the private sector for carrying out the waste management activities is also essential since it has to be financially and economically viable.

It is a very rare instance where a city has been effectively maintained clean through deployment of Municipal staff alone. Innovative technologies have been employed, where the private sector has been allowed in the management of waste. Some have very successfully provided employment opportunities to the urban poor. Such participation of private sector would have to be based on options such as 'Build, Own and Operate' (BOO) and 'Build, Own, Operate and Transfer' (BOOT) basis depending upon the situation.

Another option is to procure the "Hardware" and engage the private sector to "Operate" the same. This option however, has a number of pit falls and may be sparingly used. There seems to be a wide variety of contracts in place with unclear deliverables and even more unclear methods of evaluation, penalty and reward for the service providers. This study has identified fifteen such principles that need to be kept in mind while entering into such agreements. These are covered in this part of the document.

Public Private Partnerships for Municipal Waste Management

PPP Key Principle 1: Appointment of an independent Private agency for Bulk Waste Producers

The appointment of an agency for the collection of segregated waste from bulk producers is an ideal way to tackle this type of waste. Also, the rights for award for collection and transportation of debris / bulk waste to contractors who can be allowed to charge the generators at a predetermined rate. The contractors can also be allowed to "sell" such debris to other construction sites that require land filling.

Various models can be tried for fixing the basis of payment. However, payment on the basis of actual waste generated may be difficult, till such time a very dependable system is in place to ensure that no waste finds its way into the normal municipal stream. Payments on the basis of area, number of beds / rooms, etc are simpler to enforce and do not provide any incentive for manipulation. Association of the affected

generator groups may be involved in the process of appointment of an agency, fixing the rates and in monitoring its performance.

PPP Key Principle 2: House to House Collection contracts to Waste Pickers/NGO's or SHG's

House to House Collection contracts, as a Priority can be given to cooperatives of waste pickers / women groups. There is a deficiency of trained people to handle house to house collection accompanied by segregation of waste. Hence, there is all the more reason to utilize the expertise of waste pickers for this work. The need of the hour is to put the informal sector at the beginning of the collection chain rather being at its fag end. These very waste pickers can be "employed" to carry out house to house collection of segregated waste so that they do not need to rummage for recyclables through mixed waste at community bins and processing sites. They should be allowed to sell the recyclables. BBMP may pay them a small amount per household covered.

They could be allowed to convert biodegradable waste into manure at a suitable place in neighbourhood gardens and allowed sell the same. In addition inclusion of wastepickers in operating the bio methanization and other organic processes Conditions to wear specified uniforms, carrying identity cards and giving them attractive designations helps in giving them the requisite status and place in the society. They can thus earn a livelihood in a much more hygienic manner and can get dignity of labour as opposed to their current status of being a social outcast.

Formation of larger groups could be encouraged by giving contracts to NGOs/CBOs, Institutions, Cooperatives and Collectives which employ such deprived sections of the city population. This enables comprehensive contracts for waste management to be given. Another way is to provide equipments from BBMP funds which can be recovered from amounts payable to them.

PPP Key Principle 3: Having Comprehensive Contracts

Such contracts should be comprehensive in nature. They should ideally require the contractor to collect waste from each household, transport the same to the processing site, and sweep the roads as well as keep clean the roads side drains, and other public places in a given area. The contractor can also be given the right of enforcement of rules. The contractor, in such cases, ensures that households hand over waste to his staff directly. When this is done he is required to deploy less staff to clean roads and public places. This also reduces the managerial burden considerably.

Model 1

The first model (using own staff) is most common. However, the extent of compliance to rules is limited by budgetary constraints and on the ability to discipline and control the staff. Fund constraint to provide other inputs (vehicles, etc.) often hold back the effort. More important, the work is rarely done 365 days a year.

Model 2

The system of giving small and multiple contracts is very easy and quick to implement. Private entrepreneurs are willing to invest in collection and transportation equipment, as well as providing labor, tools, equipments, etc. Local bodies can cover the city even with limited resources. This has a major disadvantage of fragmenting the accountability. Whenever the city is not clean, there is a tendency to pass the blame between the contractors / municipal staff. Community bins have to be provided. Segregation of waste is nearly impossible. It is difficult to determine whether mixed waste was collected from generators, or it got mixed during transportation. The city may have all the requisite staff and machinery, but it may still look dirty and unkempt, with dust bins and garbage being visible all over the city.

Model 3

A comprehensive contract for handling municipal waste has an advantage of relieving the micro-management of the waste handling process. Instead of handling many small contracts, only one contract and can focus on monitoring of results / outputs. It allows the city to eliminate community bins as the agency can directly, or through very limited transfer points, take garbage directly to processing site. In addition, with proper incentives the contractor can carry out processing of waste and reduce the quantity reaching the land fill.

PPP Key Principle 4: Contracts be Performance Oriented. Payments for outputs and not for inputs

With a view to make sure that the system works efficiently, it is essential that contracts be performance oriented, or be output based. For example, it could be on the basis of households covered, or in case of comprehensive contract, on keeping a given part of the city free of garbage. Contracts which require a certain number of labour or vehicles to be provided, trips to be made between certain hours, etc. must be avoided as it is an incorrect practice. Freedom should be given to the contractor to decide how to do the assigned work. This would give him scope to improve efficiency and thus bring down costs The contractor shall prepare a detailed action plan within a broad

parameters prescribed by BBMP. It could finally approve the action plan.

There are various methods for making payments to the agencies engaged for waste management.

i) weight basis / container basis

ii) household basis

iii) lump-sum with performance indicator basis.

The payment to the operator should not be on weight basis. Here the private operator has no incentive to reduce the waste through segregation. In fact it would provide an incentive to discourage segregation, and even bring debris, etc to the processing point to get more payment. The ideal system would be to pay a fixed amount for a certain specified job (of clearing all the garbage from a given locality and house to house collection, street sweeping,) However, payment on weight basis can be adopted when differential payments for mixed and segregated waste have been prescribed. Here the operator is allowed to bring unlimited quantity of segregated waste, but only a limited quantity of mixed waste to the processing site. The payments could be linked to the fulfilment of the overall objective of maintaining cleanliness in a given area. This is ideal for comprehensive contracts. The reporting on parameters of quality of services may be entrusted to local citizens groups. This would also keep a tab on performance of the operators.

The contractor charges can be paid as per a point system based on various parameters measuring quality of service. The performance measurement is carried out ward wise through joint inspections against various parameters and the satisfaction level is decided worked out on the basis of weightage against each item. During inspection, an opportunity is given to rectify the defects and improve the performance up to 100%. Higher the points, higher will be the payments. This motivates the operator to give better services also.

PPP Key Principle 5: Contractor to provide its own Vehicles.

Instead of acquiring new vehicles, BBMP should obtain the services of waste transportation under a contract where the contractor engages his own vehicles. Even where vehicles are owned by the BBMP, they should invariably be operated by an agency under a contract. Whenever BBMP plans to purchase the new vehicle then it need to be purchased along with the operation and maintenance along with the buyback scheme for a certain period years. The supplier/ contractor can deploy his own staff, fuel and carry out repair and maintenance of the vehicles. The vehicles can be returned to the BBMP good condition at end of the contract or taken back by the

supplier as per the contract condition. Periodical inspection can be carried out to avoid any misuse. The fleet utilization is seen to be more efficient when the vehicles are maintained through such means.

The period of the contract should be such that it provides adequate time for the contractor to recover the investments made. Usually, where vehicles are provided by BBMP contracts could be for 1-3 years, while those where the contractor or supplier has to get his own equipment the contracts could be for 5-7 years (with a provision for annual review).

PPP Key Principle 6: Contractor to be responsible for Labour Laws

The BBMP shall engage only registered contractors. It should be binding on the Contractor to provide necessary facilities to the workers as per the Contract Labour Act, 1970 and other labour legislation. The contractor also should ensure payment as per the Minimum Wages Act. The contractor cannot employ people under-18 years of age. The workers must be given identity cards, as well as two sets of uniforms, gloves, mask, boot, raincoats, etc. He also must carry out mandatory annual medical check up for all the workers. The contractor should keep the Corporation indemnified in respect of all claims and should insure all the workers as well as equipments.

Private Sector Participation in Waste Processing

PPP Key Principle 7: Engaging a Private Operator for Waste Processing

Waste processing is a capital intensive activity. Moreover, processing plants employ complex technology and are difficult to be operated efficiently by BBMP Staff. It is also cumbersome to enter into contracts with private operators who have not invested their own funds to set up such plants, without the risk of the plants being mismanaged or not being maintained in the best possible manner.

The work of waste processing to some private agencies . The responsibility of creating the infrastructure and incurring the capital cost (land, building, machinery) along with operation and maintenance lies over the private entrepreneur. The responsibility of ensuring that landfilling is restricted to only inerts or 20% of the waste received as per the Rules. The agency is responsible for obtaining the necessary clearances from KSPCB and also to upgrade the plant as required by the rules. The Corporation is responsible to regularly supply of segregated municipal waste at the plant site for which tipping fees need to either per ton of reject or per ton of accept

The long tenure contracts already in place should be reviewed and modified if need be in accordance with the Targets set for implementation of the policy . The contracts

should also be reviewed targets for updation of facilities on site , accepting targets for complying with processing through various methods and reducing the waste that can be landfilled to 20%.

BBMP was the first city to enter into a composite contract with a private operator M/s Ramky to process and then land fill the rejects to an engineered sanitary landfill. The operator developed the facility on land provided by the corporation. The operator was given freedom to adopt any suitable technology to process municipal waste. He is to ensure that the project conforms with the relevant laws and has to obtain and maintain all necessary clearances from the authorities. The operator shall try to obtain carbon credits by adopting greenhouse gas mitigation measures and share the benefits of such carbon credits with the Corporation, if and when available.

The operator maintains the plant and is free to sell the power, compost or any other material produced after processing. The corporation gets 500 tons of compost free of cost, annually. The operator is to accept all the municipal waste (upto 600-800 tons) except hazardous and bio-medical waste. The corporation is to pay the operator a tipping fee of Rs 189 per tonne (escalations are provided) for waste accepted. A penalty is levied if the operator fails to accept the waste.

Present Processing Facilities in BBMP

1. M/s. Ramky Energy & Environment Ltd., Mavallipura, Bangalore.

- Extent: 100 acres on lease from Gok to BBMP (46acres utilized).
- Capacity: 600 MTPD.
- BOT Basis.
- Commercial Operation Date (COD): 29.01.2007.
- Tipping Fee: Rs: 218/- per MT of land filled rejects.
- End Product: Bio Compost.
- Scientific Landfill for rejects.
- Period: 20 yrs + 15 yrs (Post Closure).
- Up gradation by 480 MTPD with Waste to Energy proposal or adopt any other suitable modern technology for processing.
- Authorization valid up to 31-12-2010.
- No development zone declared for 1 kilometer radius by GoK. Now acquisition proposed for 500 m radius.

2. M/s. Sinivasa Gayatri Resourse Recovery Ltd., Mandur, Bangalore.

Total Extent of land 135 acres

- Extent: 35+50 acres on lease basis.
- Period: 33 yrs + 15 yrs (Post Closure).
- Capacity: 1000 MTPD.
- Tipping Fee: Rs: 189/- per MT of land filled rejects.
- End Product: Power of 8 MW to be commissioned by February 2011.
- Scientific Landfill for rejects.
- Presently receiving 800 MTPD.

3.M/s. Terra Firma Biotechnologies Ltd.,Bangalore Rural Dist.

- Extent: 90.07 acres. (Terra firma land).
- Capacity: 1000 MTPD.
- Tipping Fee: Rs: 66/- per MT of MSW supplied by BBMP.
- End Product: Compost, Vermi compost, Gasification (Waste to Energy) and Brick Making.
- Scientific Landfill for rejects.
- Period: 20 yrs + 15 yrs (Post Closure).
- Agreement executed on 30.05.2008.
- Plant in operation from 20-11-2009.

Projects under process

Sl.No	Particulars	Capacity	Remarks
1	Hanjeer Biotech Pvt Ltd (R.R. Nagar)	750 MTPD	Automated segregation and processing plant (yet to start)
2	MK Aeromatics Pvt Ltd (Mandur Northern part	10 TPD of Plastic	Conversion of plastic to crude oil (yet to start)
3	KCDC (Bagandoddi)	300 MTPD	Composting (yet to start)
4	Dry waste collection centers	600 MTPD	Recycling Centers
5	Biomethanization Plant	120 MTPD (24 units of 5 ton capacity each)	Production of Biogas

PPP Key Principle 8: Selection of Technology

Except for low cost technologies like vermi-composting and biogas plants, avoid getting attached to a particular technology. This is especially so for expensive

technologies for converting waste to power. The technology keeps on evolving. What is acceptable today may soon become outdated tomorrow. (See the extracts of the recent news report about the case in Supreme Court, regarding incineration of bio-medical waste). The agency shall be selected on the basis of the least cost option to manage the waste. This is best determined by the per tonne cost of managing waste (tipping fee model).

We have left the technology to be decided between the service provider and the state pollution control board. The permissions for the processing plant can be taken by the private operator. KPCB gives authorization after periodically inspecting the facility to ensure that it continues to remain within the rules. BBMP can ensure the same by means of imposing suitable pre-agreed penalties for the failure to keep the licenses intact. The operator must also be made responsible for updating the technology as required by the rules from time to time.

PPP Key Principle 9: Entering into a right Contract

The private operators are willing to provide their own land for setting up a processing facility since the requirement of land and cost of transportation is a small proportion of the total cost of waste This allows the BBMP to have a contract for a shorter period. It also makes the entering of the contract as well as its termination simpler. Besides this limited land resource can be put to better use . Some of the Agencies have come forward to process the waste wherein, the land for processing plant is made available by the agency himself.

Where it becomes necessary to provide public land, BBMP should let out the land (and building) by charging a rent as per the market rates. This clause does not apply to the Decentralised processing units like the Dry Waste Collection Centers, composting bio methanation facilities constructed at Ward Level. Alternatively, the municipal body could charge a royalty to the operator for doing business in its area. Payments may be made on the basis of tonnage disposed (tipping charges). The charges should be based on the type of waste going to the landfill site – it should be different for segregated and mixed garbage. The tipping fee should be lower for segregated waste (may be zero or even negative) since this can be processed into manure. It should be higher for mixed waste. This shall also provide a built in incentive (and monitoring) for to provide better quality of garbage through enforcement of segregation. Simultaneously, the agency undertaking waste collection and transportation, could be paid an incentive for bringing segregated waste. Another option to reduce the amount of mixed waste coming on the processing plant could be allowing the contractor to bring unlimited quantity of segregated waste but only a certain maximum quantity of mixed waste free

of cost. The agency would be liable to a "tipping fee" for the quantity over and above the free limit. This free quantity of mixed waste could gradually be reduced on a month-to-month basis. This would encourage the contractor to educate the public and his staff to segregate the waste.

The responsibility of mutually resolving the quality of garbage may be between the two operators – one transporting waste at the processing site, and the other processing the received waste. Disputes could be resolved by the BBMP. There must be built in incentives to ensure proper processing of waste and minimum rejects being generated in the processing plant. Thus the responsibility of land filling the rejects could be that of the operator. However, where the land fill site is managed separately from the processing plant, a tipping charge could be charged for the rejects beyond a maximum permissible quantity. Similarly, transportation of rejects could be the contractor's responsibility. This will help to achieve a self-monitoring system of ensuring that all bio-degradables are efficiently processed. As it may be difficult for the operator to find a scientific site for the landfill of the ash/rejects from the treatment plant and he may resort to unscrupulous dumping. To prevent this, BBMP shall allow land fill of treated waste on its landfill site on collection of suitable tipping charges.

PPP Key Principle 10: Sale of compost / products

The sustainability of composting and other similar projects depends upon regular sale of the compost / products. It is important to realize that the compost should meet the requirements of farmers before it can be sold. Suitable technical assistance has to be taken from the agriculture departments/universities and existing institutions like Karnataka Compost Development Corporation (KCDC) to improve the quality of compost. A constant control of quality is a must. To ensure increased sale of compost, awareness has to be created about the benefits of using the organic compost amongst the farmers. Pricing of compost is also important. It must be able to compete with existing organic manures. A private operator can price the manure to suit the demand and the quality. The selling of compost should be the responsibility of a private operator. The private operator can supply certain quantity of compost to BBMP for city gardens. Also the BBMP can levy a royalty on the sale of compost.

PPP Key Principle 11: Carbon Credits

Carbon credits may be a very attractive way to finance scientific processing of waste. This is specially so with the signing of the Kyoto Protocol under which tradable carbon credits have become available. The possibility to generate revenues in future from the processing and reduction of waste should be explored or the option kept

open. It is advisable to retain a clause to share the rights in the future in case they become available.

Kyoto Protocol : Climate Change & Global Warming

Introduction

The Kyoto Protocol is probably one of the most important international agreements associated with environment protection. Information on climate change from sea level to the highest peak, Mt. Everest supports evidence for global warming as a result of human activities, which have been accelerating the emissions of greenhouse gases such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF6). Scientists have estimated it will double by the middle of this century if the present level of its emission continues. This will bring a drastic climate change, leading to increase in temperature or global warming, sea level rise and flooding, changes in weather patterns with more frequent storms and hurricanes, alteration of ecosystems, agricultural productivity, expansion of deserts, and rapid loss of biodiversity. Only international agreement and efforts can be meaningful in addressing such a global-level issue. This generated UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol.

Initiative

International response to climate change was initiated in 1992 at the Earth Summit in Rio de Janeiro by signing of the UNFCCC. The main objective of the convention was to stabilize greenhouse gases in the atmosphere at a level that would not affect the climate system. Conference of the Parties, comprised of more than 188 countries that have ratified the convention is the apex decision-making body regarding the policies, strategies, and future plans of the climate change. In order to achieve the objective, the convention set a voluntary goal reducing emissions from developed countries to 1990 levels by 1995. Since most of the countries did not meet this goal, the Kyoto Protocol was adopted in December 1997 in Kyoto of Japan for a stronger initiative. The Protocol set binding emission targets for developed countries that would reduce their emissions on average 5.2 per cent below 1990 levels by the year 2012. Initially, 40 developed countries (e.g., Australia, Canada, Japan, USA and others) plus the European Economic Community of the UNFCCC, agreed to limit their greenhouse gas emissions. Developing countries, received some relaxed time period for their action. These different treatments between the developed countries and the developing ones

including rapidly industrializing countries (e.g., Brazil, China, and India) and their exemptionbecame a major point of difference among the parties. Australia and the USA said that the treaty would damage their economy and the USA actually withdrew from the Protocol after 2001. But with the signing of Russia in October 2004 and ratification of 136 countries, the Protocol came into force on February 16, 2005 with an initial commitment period of 2008-2012.

Mechanism to reduce Emissions

In order to help countries reduce the cost of meeting their emissions reduction targets, the Kyoto Protocol has developed three market-based mechanisms including joint implementation mechanism (JIM), clean development mechanisms (CDM), and emissions trading mechanism (ETM). The JIM indicates that a country can invest in an emission reduction or sink enhancement project in another (Annex B country) to earn emission reduction units. The CDM is designed to promote sustainable development in developing countries and assist industrialized countries of Annex I in meeting their commitments of reducing greenhouse gas emissions. This allows them to invest in emission reduction projects in developing countries and receive credits for achieving such reductions. The ETM allows any emitters including countries, companies, etc., to buy from or sell emissions to other emitters. This mechanism can bring down the costs of meeting emission targets by allowing those who can achieve reductions cheaper to sell excess reductions to those whose reduction cost is more expensive.

The Kyoto Protocol's coming into force is a major leap in achieving the UNFCCC long-term goal of stabilizing global climate. But the challenges of the protocol are growing more than ever before. It is believed that more than 60 percent emission reductions are needed to avert serious climate change impacts. Industrialized countries account for roughly half of global greenhouse gas emissions. Since, Australia and the USA, the world's top source of carbon dioxide, have not joined the Protocol, it will not be easy to achieve that target. It will be even worse if other industrialized countries did not participate effectively. For example, Italyhas already indicated that it would reconsider its position if the USA did not join the Protocol. The main challenge is to forge an agreement among the major emitters or developed and developing countries and in global emissions. Besides, how to integrate climate issues with the development programs particularly in developing countries has not been adequately planned and implemented.

8 THE LEGAL FRAMEWORK

It is important that we need to understand the legal framework under which the Municipal Solid Waste is to be managed in their jurisdiction. In the study it was found that not all laws / rules are available with the field staff. Also they are not available in the local language. All these need much wider dissemination. In this part of the report, the legal framework in which we required to manage waste is reproduced. This includes the recommendations of the committee set up by the supreme court, the enactments of the central as well as the state governments as well as the important government orders on the subject.

First of all a summary of the recommendations of the committee set up by the Hon'able Supreme Court of India for suggesting improvements in Solid Waste Management practices in Class I cities is given. This report has several excellent recommendations. Many of the subsequent enactments rely on it.

Next is the Municipal Solid Waste (Management & Handling) Rules 2000 framed under the provisions of the Environment (Protection) Act, 1986 by the Ministry of Environment and Forests, Government of India. These make the municipal authority responsible for an effective collection, storage, segregation, transportation, processing and disposal of Municipal Solid Waste within its territorial area. The Rules stress upon collection of waste from its source of generation (households, office complexes, commercial areas). The waste from hotels, restaurants, fruits and vegetable markets, meat and fish markets are to be separately collected. Horticulture and construction wastes / debris should be separately collected and disposed off. The Municipal body is responsible to organize awareness programs for segregation and recycling of waste. The Municipal authorities are required to adopt proper technologies to recycle and process waste so as to minimize burden on landfill as prescribed in the Rules. Disposal of waste in land fill sites should be restricted for that which cannot be reused / recycled or processed. Disposal in land fill sites should be carried out in a scientific manner as prescribed in the rules. The standards of composting, treated leachate and incineration are given.
This is followed by the Plastic Waste (Management and Handling) Rules, 2011, again issued by the Ministry of Environment and Forests, Government of India.

Summary of Report of the Committee Constituted by the Hon'ble Supreme Court of India (March,

1999) Storage of Waste at Source

No waste shall be thrown on the streets, footpaths, open spaces, drains or water bodies. Waste shall be stored at the source of waste generation in two bins/bags, one

for food waste / bio-degradable waste and another for

recyclable waste such as papers, plastic, metal glass , rags etc. (see Annex 'A' & 'B')Waste such as used batteries, containers for chemicals and pesticides, discarded medicines and other toxic or hazardous household waste, if and when produced, should be kept separately from the above two streams of waste.

Segregation of Recyclable Waste

The local bodies shall direct households, shops and establishments not to mix recyclable waste with domestic food / biodegradable waste and instead keep recyclable / non- biodegradable waste in a separate bin or bag at the source of waste generation.

Primary Collection of Waste

Domestic , trade and institutional food / bio-degradable waste, shall be collected from the doorstep or from the community bin on a daily basis. Recyclable waste material / non bio-degradable waste other then toxic and hazardous waste shall be collected from the source of waste generation at the frequency and in the manner, notified by the local body from time to time. Domestic hazardous / toxic waste material shown in annexure 'b' shall be deposited by the waste producers in special bins that may be provided by the local body at various places in the city for depositing such waste.

Sweeping of Streets & Public Spaces

All public roads, streets, lanes and bye-lanes having habitation or commercial activity on one or both sides of the street shall be cleaned on a daily basis, assigning a clearly demarcated area to each sweeper and street sweepings shall be deposited in the container placed at the temporary waste storage depot established in the city.

Provision of Litter Bins

Adequate numbers of litter bins shall be placed in urban areas at railway stations, bus station, market places, parks and gardens and important commercial streets to prevent the littering of streets and public places.

Temporary waste storage depots for onward transportation of waste

All open waste storage sites should be abolished expeditiously and all dust bins made of cement pipes, metal rings, masonry construction should also be replaced in a phased manner by a temporary waste storage facility in the form of a neat, mobile, closed, large body container, or a parked vehicle, for temporary storage of waste

collected through containerized hand-carts / containerized tricycles etc., from the door steps and / or from the community bins, for onward transportation of waste in a cost effective manner.

Transportation of Waste

Transportation of waste shall be done regularly to ensure that the containers / trolleys and dustbin sites are cleared before they start over-flowing. The frequency of transportation shall be arranged accordingly. The system of transportation of waste must synchronizewith bulk storage of waste at the temporary waste storage depots. Multiple and manual handling of waste should be avoided.

Recommended Processing And Landfill Options

All organic / bio-degradable wastes collected from households, shops, markets, hotels a

nd other establishments shall first be composted by following suitable methods of composting with or without power generation as deemed appropriate. Only rejects and domestic hazardous waste shall be carefully land filled. Bio medical waste shall be processed and managed as per the bio-medical waste (management and handling) rules,1998.

Institutional Aspects & Capacity Building

The local body shall take adequate measures for institutional strengthening through induction of professionals, decentralization of administration, delegation of powers, human resources development, private sector and NGO participation.

Appendix-1

Municipal Solid Wastes (Management and Handling) Rules, 2000

MINISTRY OF ENVIRONMENT AND FORESTS
NOTIFICATION
New Delhi, the 25th September, 2000

S.O. 908(E). – Whereas the draft of the Municipal Solid Wastes (Management and Handling) Rules, 1999 were published under the notification of the Government of India in the Ministry of Environment and Forests number S.O. 783(E), dated, the 27th September, 1999 in the Gazette of India, Part II, Section 3, Sub-section (ii) of the same date inviting objections and suggestions from the persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which the copies of the Gazette containing the said notification are made available to the public;

And whereas copies of the said Gazette were made available to the public on the 5th October, 1999;

And whereas the objections and suggestions received from the public in respect of the said draft rules have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by section 3, 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules to regulate the management and handling of the municipal solid wastes, namely:-

1. Short title and commencement.-

(1) These rules may be called the Municipal Solid Wastes (Management and Handling) Rules, 2000.

(2) Save as otherwise provided these rules, they shall come into force on the date of their publication in the Official Gazette.

2. Application .-- These rules shall apply to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes.

3. Definitions.—In these rules, unless the context otherwise requires, -

(i) "**anaerobic digestion**" means a controlled process involving microbial decomposition of organic matter in the absence of oxygen;

(ii) **"authorization"** means the consent given by the Board or Committee to the

"operator of a facility";

(iii) **"biodegradable substance"** means a substance that can be degraded by micro-organisms;

(iv) **"biomethanation"** means a process which entails enzymatic decomposition of the organic matter by microbial action to produce methane rich biogas;

(v) **"collection"** means lifting and removal of solid wastes from collection points or any other location;

(vi) **"composting"** means a controlled process involving microbial decomposition of organic matter;

(vii) **"demolition and construction waste"** means wastes from building materials debris and rubble resulting from construction, re-modelling, repair and demolition operation;

(viii) **"disposal"** means final disposal of municipal solid wastes in terms of the specified measures to prevent contamination of ground-water, surface water and ambient air quality;

(ix) **"Form"** means a Form appended to these rules;

(x) **"generator of wastes"** means persons or establishments generating municipal solid wastes;

(xi) **"landfilling"** means disposal of residual solid wastes on land in a facility designed with protective measures against pollution of ground water, surface water and air fugitive dust, wind-blown litter, bad odour, fire hazard, bird menace, pests or rodents, greenhouse gas emissions, slope instability and erosion;

(xii) **"leachate"** means liquid that seeps through solid wastes or other medium and has extracts of dissolved or suspended material from it;

(xiii) **"lysimeter"** is a device used to measure rate of movement of water through or from a soil layer or is used to collect percolated water for quality analysis;

(xiv) **"municipal authority"** means Municipal Corporation, Municipality, Nagar Palika, Nagar Nigam, Nagar Panchayat, Municipal Council including notified area committee (NAC) or any other local body constituted under the relevant statues and, where the management and handling of municipal solid waste is entrusted to such agency;

(xv) **"municipal solid waste"** includes commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes;

(xvi) **"operator of a facility"** means a person who owns or operates a facility for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes and also includes any other agency appointed as such by the municipal authority for the management and handling of municipal solid wastes in the respective areas;

(xvii) **"pelletisation"** means a process whereby pellets are prepared which are small cubes or cylindrical pieces made out of solid wastes and includes fuel pellets which are also referred as refuse derived fuel;

(xviii) **"processing"** means the process by which solid wastes are transformed into new or recycled products;

(xix) **"recycling"** means the process of transforming segregated solid wastes into raw materials for producing new products, which may or may not be similar to the original products;

(xx) **"Schedule"** means a Schedule appended to these rules;

(xxi) **"segregation"** means to separate the municipal solid wastes into the groups of organic, inorganic, recyclables and hazardous wastes;

(xxii) **"State Board or the Committee"** means the State Pollution Control Board of a State, or as the case may be, the Pollution Control Committee of a Union territory;

(xxiii) **"storage"** means the temporary containment of municipal solid wastes in a manner so as to prevent littering, attraction to vectors, stray animals and excessive foul odour;

(xxiv) **"transportation"** means conveyance of municipal solid wastes from place to place hygienically through specially designed transport system so as to prevent foul odour, littering, unsightly conditions and accessibility to vectors;

(xxv) **"vadose water"** water which occurs between the ground, surface and the water table that is the unsaturated zone;

(xxvi) **"vermicomposting"** is a process of using earthworms for conversion of bio-degradable wastes into compost.

4. Responsibility of municipal authority .-

(1) Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules, and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes.

(2) The municipal authority or an operator of a facility shall make an application in **Form-I,** for grant of authorization for setting up waste processing and disposal facility including landfills from the State Board or the Committee in order to comply with the implementation programme laid down in **Schedule I.**

(3) The municipal authority shall comply with these rules as per the implementation schedule laid down in **Schedule I.**

(4) The municipal authority shall furnish its annual report in **Form-II**,-

(a) to the Secretary-incharge of the Department of Urban Development of the concerned State or as the case may be of the Union territory, in case of a metropolitan city; or

(b) to the District Magistrate or the Deputy Commissioner concerned in case of all other towns and cities,

with a copy to the State Board or the Committee on or before the 30th day of June every year.

5. Responsibility of the State Government and the Union territory Administrations. --

(1) The Secretary-incharge of the Department of Urban Development of the concerned State or the Union territory, as the case may be, shall have the overall responsibility for the enforcement of the provisions of the provisions of these rules in the metropolitan cities.

(2) The District Magistrate or the Deputy Commissioner of the concerned district shall have the overall responsibility for the enforcement of the provisions of these rules within the territorial limits of their jurisdiction.

6. Responsibility of the Central Pollution Control Board and the State Board or the Committees .--

(1) The State Board or the Committee shall monitor the compliance of the standards regarding ground water, ambient air, leachate quality and the compost quality including incineration standards as specified under **Schedules II, III** and **IV.**

(2) The State Board of the Committee, after the receipt of application from the municipal authority or the operator of a facility in **Form I,** for grant of authorization

for setting up waste processing and disposal facility including landfills, shall examine the proposal taking into consideration the views of other agencies like the State Urban Development Department, the Town and Country Planning Department, Air Port or Air Base Authority, the Ground Water Board or any such other agency prior to issuing the authorization.

(3) The State Board or the Committee shall issue the authorization in **Form-III** to the municipal authority or an operator of a facility within forty-five days stipulating compliance criteria and standards as specified in **Schedules II, III** and **IV** including such other conditions, as may be necessary.

(4) The authorization shall be valid for a given period and after the validity is over, a fresh authorization shall be required.

(5) The Central Pollution Control Board shall co-ordinate with the State Boards and the Committees with particular reference to implementation and review of standards and guidelines and compilation of monitoring data.

7. Management of municipal solid wastes .—

(1) Any municipal solid waste generated in a city or a town, shall be managed and handled in accordance with the compliance criteria and the procedure laid down in **Schedule-II.**

(2) The waste processing and disposal facilities to be set up by the municipal authority on their own or through an operator of a facility shall meet the specifications and standards as specified in **Schedules III** and **IV.**

8. Annual Reports .—

(1) The State Boards and the Committees shall prepare and submit to the Central Pollution Control Board an annual report with regard to the implementation of these rules by the 15th of September every year in **Form-IV.**

(2) The Central Pollution Control Board shall prepare the consolidated annual review report on management of municipal solid wastes and forward it to the Central Government along with its recommendations before the 15th of December every year.

9. Accident Reporting .—When an accident occurs at any municipal solid wastes collection, segregation, storage, processing, treatment and disposal facility or forthwith report the accident in **Form-V** to the Secretary in-charge of the Urban Development Department in metropolitan cities, and to District Collector or Deputy Commissioner in all other cases.

Schedule I
[see rules4(2) and (3)

Implementation Schedule

Serial No.	Compliance Criteria	Schedule
1.	Setting up of waste processing and disposal facilities	By 31.12.2003 or earlier
2.	Monitoring the performance of waste processing and disposal facilities	Once in six months
3.	Improvement of existing landfill sites as per provisions of these rules	By 31.12.2001 or earlier
4.	Identification of landfill sites for future use and making site (s) ready for operation	By 31.12.2002 or earlier

Schedule – II
[see rules 6(1) and (3), 7(1)]
Management of Municipal Solid Wastes

S.No : 1

Parameters: Collection of municipal solid wastes

Compliance criteria: 1. Littering of municipal solid waste shall be prohibited in cities, towns and in urban areas notified by the State Governments. To prohibit littering and facilitate compliance, the following steps shall be taken by the municipal authority, namely:-

(i) Organizing house-to-house collection of municipal solid wastes through any of the methods, like community bin collection (central bin), house-to-house collection, collection on regular pre-informed timings and scheduling by using bell ringing of musical vehicle (without exceeding permissible noise levels);
(ii) Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes and commercial areas;
(iii) Wastes from slaughter houses, meat and fish markets, fruits and vegetable markets, which are biodegradable in nature, shall be managed to make use of such wastes;
(iv) Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes and such wastes shall follow the rules separately specified for the purpose;
(v) Collected waste from residential and other areas shall be transferred to community bin by hand-driven containerised carts or other small vehicles;
(vi) Horticultural and construction or demolition wastes or debris shall be separately collected and disposed off following proper norms. Similarly, wastes generated at dairies shall be regulated in accordance with the State laws;
(vii) Waste (garbage, dry leaves) shall not be burnt.
(viii) Stray animals shall not be allowed to move around waste storage facilities or at

any other place in the city or town and shall be managed in accordance with the State laws.

2. The municipal authority shall notify waste collection schedule and the likely method to be adopted for public benefit in a city or town.

3. It shall be the responsibility of generator of wastes to avoid littering and ensure delivery of wastes in accordance with the collection and segregation system to be notified by the municipal authority as per para 1(2) of this Schedule.

S.No: 2
Parameters: Segregation of municipal solid wastes
Compliance criteria: In order to encourage the citizens, municipal authority shall organise awareness programmes for segregation of wastes and shall promote recycling or reuse of segregated materials. The municipal authority shall undertake phased programme to ensure community participation in waste segregation. For this purpose, regular meetings at quarterly intervals shall be arranged by the municipal authorities with representatives of local resident welfare associations and non-governmental organizations.

S.No: 3
Parameters: Storage of municipal solid wastes
Compliance criteria: Municipal authorities shall establish and maintain storage facilities in such a manner as they do not create unhygienic and insanitary conditions around it. Following criteria shall be taken into account while establishing and maintaining storage facilities, namely:-

(i) Storage facilities shall be created and established by taking into account quantities of waste generation in a given area and the population densities. A storage facility shall be so placed that it is accessible to users;
(ii) Storage facilities to be set up by municipal authorities or any other agency shall be so designed that wastes stored are not exposed to open atmosphere and shall be aesthetically acceptable and user-friendly;
(iii) Storage facilities or 'bins' shall have 'easy to operate' design for handling, transfer and transportation of waste. Bins for storage of bio-degradable wastes shall be painted green, those for storage of recyclable wastes shall be painted white and those for storage of other wastes shall be painted black;
(iv) Manual handling of waste shall be prohibited. If unavoidable due to constraints, manual handling shall be carried out under proper precaution with due care for safety of workers.

S.No: 4
Parameters: Transportation of municipal solid wastes
Compliance criteria: Vehicles used for transportation of wastes shall be covered. Waste should not be visible to public, nor exposed to open environment preventing

their scattering. The following criteria shall be met, namely:-

(i) The storage facilities set up by municipal authorities shall be daily attended for clearing of wastes. The bins or containers wherever placed shall be cleaned before they start overflowing.
(ii) Transportation vehicles shall be so designed that multiple handling of wastes, prior to final disposal, is avoided.

S.No: 5
Parameters: Processing of municipal solid wastes
Compliance criteria: Municipal authorities shall adopt suitable ? or combination of such technologies to make use of wastes so as to minimize burden on landfill. Following criteria shall be adopted, namely:-

(i) The biodegradable wastes shall be processed by composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilization of wastes. It shall be ensured that compost or any other end product shall comply with standards as specified in Schedule-IV.
(ii) Mixed waste containing recoverable resources shall follow the route of recycling. Incineration with or without energy recovery including pelletisation can also be used for processing wastes in specific cases. Municipal authority or the operator of a facility wishing to use other state-of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down before applying for grant of authorization.

S.No: 6
Parameters: Disposal of municipal solid wastes
Compliance criteria: Land filling shall be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities. Land filling of mixed waste shall be avoided unless the same is found unsuitable for waste processing. Under unavoidable circumstances or till installation of alternate facilities, land-filling shall be done following proper norms. Landfill sites shall meet the specifications as given in Schedule-lll.

Schedule III
[see rules 6(1) and (3), 7(2)]

Specifications for Landfill Sites

Site Selection

1. In areas falling under the jurisdiction of 'Development Authorities', it shall be

the responsibility of such Development Authorities to identify the landfill sites hand over the sites to the concerned municipal authority for development operation and maintenance. Elsewhere, this responsibility shall lie with the concerned municipal authority.

2. Selection of landfill sites shall be based on examination of environmental issues. The Department of Urban Development of the State or the Union territory shall co-ordinate with the concerned organisations for obtaining the necessary approvals and clearances.

3. The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan.

4. The landfill sites shall be selected to make use of nearby wastes processing facility. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.

5. The existing landfill sites which continue to be used for more than five years, shall be improved in accordance of the specifications given in this Schedule.

6. Biomedical wastes shall be disposal off in accordance with the Bio-medical Waste (Management and Handling) Rules, 1998 and hazardous wastes shall be managed in accordance with the Hazardous Wastes (Management and Handling) Rules, 1989, as amended from time to time.

7. The landfill site shall be large enough to last for 20-25 years.

8. The landfill site shall be away from habitation clusters, forest areas, water bodies, monuments, National Parks, Wetlands and places of important cultural, historical or religions interest.

9. A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land-use plans.

10. Landfill site shall be away from airport including airbase. Necessary approval of airport or airbase authorities prior to the setting up of the landfill site shall be obtained in cases where the site is to be located within 20 km of an airport or airbase.

Facilities at the Site

11. Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.

12. The landfill site shall be well protected to prevent entry of unauthorized

persons and stray animals.

13. Approach and other internal roads for free movement of vehicles and other machinery shall exist at the landfill site.

14. The landfill site shall have wastes inspection facility to monitor wastes brought in for landfill, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipments.

15. Provisions like weigh bridge to measure quantity of waste brought at landfill site, fire protection equipments and other facilities as may be required shall be provided.

16. Utilities such as drinking water (preferably bathing facilities for workers) and lighting arrangements for easy landfill operations when carried out in night hours shall be provided.

17. Safety provisions including health inspections of workers at landfill site shall be periodically made.

Specifications for land filling

18. Wastes subjected to land filling shall be compacted in thin layers using landfill compactors to achieve high density of the wastes. In high rainfall areas where heavy compactors cannot be used, alternative measures shall be adopted.

19. Waster shall be covered immediately or at the end of each working day with minimum 10 cm of soil, inert debris or construction material till such time waste processing facilities for composting or recycling or energy recovery are set up as per Schedule I.

20. Prior to the commencement of monsoon season, an intermediate cover of 40 – 65 cm thickness of soil shall be placed on the landfill with proper drainage berms shall be constructed to divert run-off away from the active cell of the landfill.

21. After completion of landfill, a final cover shall be designed to minimize infiltration and erosion. The final cover shall meet the following specifications, namely:-

    (a) The final cover shall have a barrier soil layer comprising of 60 cms of clay or amended soil with permeability coefficient less that 1×10^{-7} cm/sec.
    (b) On top of the barrier soil layer, there shall be a drainage layer of 15 cm.

(c) On top of the drainage layer, there shall be a vegetative layer of 45 cm to support natural plant growth and to minimize erosion.

Pollution prevention

22. In order to prevent pollution problems from landfill operations, the following provisions shall be made, namely:-

(a) Diversion of storm water drains to minimize leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions;

(b) Construction of a non-permeable lining system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) minimum liner specifications shall be a composite barrier having 1.5 mm high density polyethylene (HDPE) geomembrane, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than 1×10^{-7} cm/sec. The highest level of water table shall be at least two meter below the base of clay or amended soil barrier layer.

(c) Provisions for management of leachates collection and treatment shall be made. The treated leachates shall meet the standards specified in Schedule – IV;

(d) Prevention of run-off from landfill area entering any stream, river, lake or pond.

Water Quality Monitoring

23. Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 metres of the periphery of landfill site shall be periodically monitored to ensure that the ground water is not contaminated beyond acceptable limit as decided by the Ground Water Board or the State Board or the Committee. Such monitoring shall be carried out to cover different seasons in a year that is, summer monsoon and post-monsoon period.

24. Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) is to be considered after ensuring its quality. The following specifications for drinking water quality shall apply for monitoring purpose, namely:-

S.No	Parameters	IS 10500: 1991 Desirable limit (mg/1 except for pH)
1.	Arsenic	0.05
2.	Cadmium	0.01
3.	Chromium	0.05
4.	Copper	0.05
5.	Cyanide	0.05
6.	Lead	0.05
7.	Mercury	0.001
8.	Nickel	-
9.	Nitrate as NO_3	45.0
10.	PH	6.5 – 8.5
11.	Iron	0.3
12.	Total hardness (as $CaCO_3$)	300.0
13.	Chlorides	250
14.	Dissolved solids	500
15.	Phenolic compounds (as C_6H_5OH)	0.001
16.	Zinc	5.0
17.	Sulphate (as $SO_{4)}$	200

Ambient Air Quality Monitoring

25. Installation of landfill gas control system including gas collection system shall be made at landfill site to minimize odour generation, prevent off-site migration of gases and to protect vegetation planted on the rehabilitated landfill surface.

26. The concentration of methane gas generated at landfill site shall not exceed 25 per cent of the lower explosive limit (LEL)

27. The landfill gas from the collection facility at a landfill site shall be utilized for either direct thermal applications or power generation, as per viability. Otherwise, landfill gas shall be burnt (flared) and shall not be allowed to directly escape to the atmosphere or for illegal tapping. Passive venting shall be allowed if its utilisation or flaring is not possible.

28. Ambient air quality at the landfill site and at the vicinity shall be monitored to meet the following specified standards, namely:-

S.No	Parameters	Acceptable levels
(i)	Sulphur dioxide	120 ug/m^3 (24 hours)
(ii)	Suspended Particulate Matter	500 ug/m^3 (24 hours)
(iii)	Methane	Not to exceed 25 per cent of the lower explosive limit (equivalent to 650 mg/m^3)
(iv)	Ammonia daily average (Sample duration 24 hrs)	0.4 mg/m^3 (400 ug/m^3)
(v)	Carbon monoxide	1 hour average: 2 mg/m^3 8 hour average: 1 mg/m^3

29. The ambient air quality monitoring shall be carried out by the concerned authority as per the following schedule, namely:-

    (a) Six times in a year for cities having population of more than fifty lakhs;
    (b) Four times in a year for cities having population between ten and fifty lakhs;
    (c) Two times in a year for town or cities having population between one and ten lakhs.

Plantation at Landfill Site

30. A vegetative cover shall be provided over the completed site in accordance with the following specifications, namely:-

    (a) Selection of locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be allowed to grow;
    (b) The plants grown be such that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilised;
    (c) Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition;
    (d) Plantation to be made in sufficient density to minimize soil erosion.

Closure of Landfill Site and Post-care

31. The post-closure care of landfill site shall be conducted for at least fifteen years and long term monitoring or care plan shall consist of the following, namely:-

    (a) Maintaining the integrity and effectiveness of final cover, making repairs and preventing run-on and run-off from eroding or otherwise damaging the final cover;
    (b) Monitoring leachate collection system in accordance with the

requirement;

(c) Monitoring of ground water in accordance with requirements and maintaining ground water quality;

(d) Maintaining and operating the landfill gas collection system to meet the standards.

32. Use of closed landfill sites fifteen years of post-closure monitoring can be considered for human settlement or otherwise only after ensuring that gaseous and leachate analysis comply with the specified standards.

Speical provisions for hilly areas

33. Cities and towns located on hills shall have location-specific methods evolved for final disposal of solid wastes by the municipal authority with the approval of the concerned State Board or the Committee. The municipal authority shall set up processing facilities for utilization of biodegradable organic wastes. The inert and non-biodegradable waste shall be used for building roads or filling-up of appropriate areas on hills. Because of constraints in finding adequate land in hilly areas, wastes not suitable for road-laying or filling up shall be disposed of in specially designed landfills.

Schedule IV
[see rules 6(1) and (3), 7(2)]

Standards for Composting, Treated Leachates and Incineration

1. The waste processing or disposal facilities shall include composting incineration, pelletisation, energy recovery or any other facility based on state-of-the-art technology duly approved by the Central Pollution Control Board.
2. In case of engagement of private agency by the municipal authority, a specific agreement between the municipal authority and the private agency shall be made particularly, for supply of solid waste and other relevant terms and conditions.
3. In order to prevent pollution problems from compost plant and other processing facilities, the following shall be complies with, namely:-

   (i) The incoming wastes at site shall be maintained prior to further processing. To the extent possible, the waste storage are should be covered. If, such storage is done in an open area, it shall be provided with impermeable base with facility for collection of leachate and surface water run-off into lined drains leading to a leachate treatment and disposal facility;

   (ii) Necessary precautions shall be taken to minimise nuisance of odour, flies, rodents, bird menace and fire hazard;

(iii) In case of breakdown or maintenance of plant, waste intake shall be stopped and arrangements be worked out for diversion of wastes to the landfill site;

(iv) Pre-process and post-process rejects shall be removed from the processing facility on regular basis and shall not be allowed to pile at the site. Recyclables shall be routed through appropriate vendors. The non-recyclables shall be sent for well designed landfill site(s).

(v) In case of compost plant, the windrow area shall be provided with impermeable base. Such a base shall be made of concrete or compacted clay, 50 cm thick, having permeability coefficient less than 10^{-7} cm/sec. The base shall be provided with 1 to 2 per cent slope and circled by lined drains for collection of leachate or surface run-off;

(vi) Ambient air quality monitoring shall be regularly carried out particularly for checking odour nuisance at down-wind direction on the boundary of processing plant.

(vii) In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:-

Parameters	Concentration not to exceed * (mg/kg dry basis, except pH value and C/N ratio)
Arsenic	10.00
Cadmium	5.00
Chromium	50.00
Copper	300.00
Lead	100.00
Mercury	0.15
Nickel	50.00
Zinc	1000.00
C/N ration	20-40
PH	5.5-8.5

* Compost (final product) exceeding the above stated concentration limits shall not be used for food crops. However, it may be utilized for purpose other than growing food crops.

4. The disposal of treated leachates shall follow the following standards, namely:-

S.No	**Parameter**	**Standards (Mode of Disposal)**		
		Inland surface water	**Public sewers**	**Land disposal**
1.	Suspended solid, mg/1, max	100	600	200

2.	Dissolved solids (inorganic) mg/1, max	2100	2100	2100
3.	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4.	Ammonical nitrogen (as N), mg/1, max	50	50	-
5.	Total Kjeldahl nitrogen (as N), mg/1, max.	100	-	-
6.	Biochemical oxygen demand (3 days at 27^0 C_ max. (mg/1)	30	350	100
7.	Chemical oxygen demand, mg/1, max.	250	-	-
8.	Arsenic (as As), mg/1, max	0.2	0.2	0.2
9.	Mercury (as Hg), mg/1, max	0.01	0.01	-
10.	Lead (as Pb), mg/1, max	0.1	1.0	-
11.	Cadmium (as Cd), mg/1, max	2.0	1.0	-
12.	Total Chromium (as Cr), mg/1, max.	2.0	2.0	-
13.	Copper (as Cu), mg/1, max	3.0	3.0	-
14.	Zinc (as Zn), mg/1, max	5.0	15	-
15.	Nickel (as Ni), mg/1, max	3.0	3.0	-
16.	Cyanide (as CN), mg/1, max	0.2	2.0	0.2
17.	Chloride (as Cl), mg/1, max	1000	1000	600
18.	Fluoride (as F), mg/1, max	2.0	1.5	-
19.	Phenolic compounds (as C_6H_5OH) mg/1, max.	1.0	5.0	-

Note: While discharging treated leachates into inland surface waters, quantity of leachates being discharged and the quantity of dilution water available in the receiving water body shall be given due consideration.

5. The incinerators shall meet the following operating and emission standards, namely:-

A. Operating Standards

(1) The combustion efficiency (CE) shall be at least 99.00%
(2) The combustion efficiency is computed as follows:

$$C.E. = \frac{\%CO_2}{\%CO_2 + \%CO} \times 100$$

B. Emission Standards

Parameters	Concentration mg/Nm^3 at (12% CO_2 correction)
(1) Particulate matter	150
(2) Nitrogen Oxides	450
(3) HCI	50

(4) Minimum stack height shall be 30 metres above ground.
(5) Volatile organic compounds in ash shall not be more than 0.01%.

Note:

(1) Suitably designed pollution control devices shall be installed or retrofitted with the incinerator to achieve the above emission limits, if necessary.
(2) Wastes to be incinerated shall not be chemically treated with any chlorinated disinfectants.
(3) Chlorinated plastics shall not be incinerated.
(4) Toxic metals in incineration ash shall be limited within the regulatory quantities as specified in the Hazardous Waste (Management and Handling) Rules, 1989 as amended from time to time.
(5) Only low sulphur fuel like LDO, LSHS Diesel shall be used as fuel in the incinerator.

Form I [see Rules 4(2) and 6(2)] Application for obtaining authorization

Form II [See Rule 4(4)] Format of Annual Report to be submitted by the Municipal Authority

Form III [See Rule 6 (3)] Format of Issue of Authorisation

Form IV [See rule 8(1)] Format of Annual Review Report to be submitted by the State Pollution Control Board/Committees to the Central Pollution Control Board
Form V [See Rule (9)] Accident reporting
[Details of 5 Forms not with me in soft copy. Can send full Hard Copy if reqd]

BIO-MEDICAL WASTE (MANAGEMENT AND HANDLING) RULES, 1998

MINISTRY OF ENVIRONMENT & FORESTS

NOTIFICATION

New Delhi, 20th July, 1998

S.O. 630 (E).-Whereas a notification in exercise of the powers conferred by Sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986) was published in the Gazette vide S.O. 746 (E) dated 16 October, 1997 inviting objections from the public within 60 days from the date of the publication of the said notification on the Bio-Medical Waste (Management and Handling) Rules, 1998 and whereas all objections received were duly considered..

Now, therefore, in exercise of the powers conferred by section 6, 8 and 25 of the Environment (Protection) Act, 1986 the Central Government hereby notifies the rules for the management and handling of bio-medical waste.

1. SHORT TITLE AND COMMENCEMENT:

(1) These rules may be called the Bio-Medical Waste (Management and Handling) Rules, 1998.

(2) They shall come into force on the date of their publication in the official Gazette.

2. APPLICATION:

These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio medical waste in any form.

3. DEFINITIONS:

In these rules unless the context otherwise requires

(1) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);

(2) "Animal House" means a place where animals are reared/kept for experiments or testing purposes;

(3) "Authorisation" means permission granted by the prescribed authority for the generation, collection, reception, storage, transportation, treatment, disposal and/or any other form of handling of bio-medical waste in accordance with these rules and any guidelines issued by the Central Government.

(4) "Authorised person" means an occupier or operator authorised by the prescribed authority to generate, collect, receive, store, transport, treat, dispose and/or handle bio-medical waste in accordance with these rules and any guidelines issued by the Central Government;

(5) "Bio-medical waste" means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule I;

(6) "Biologicals" means any preparation made from organisms or micro-organisms or product of metabolism and biochemical reactions intended for use in the diagnosis, immunisation or the treatment of human beings or animals or in research activities pertaining thereto;

(7) "Bio-medical waste treatment facility" means any facility wherein treatment. disposal of bio-medical waste or processes incidental to such treatment or disposal is carried out;

(8) "Occupier" in relation to any institution generating bio-medical waste, which includes a hospital, nursing home, clinic dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called, means a person who has control over that institution and/or its premises;

(9) "Operator of a bio-medical waste facility" means a person who owns or controls or operates a facility for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste;

(10) "Schedule" means schedule appended to these rules;

4. DUTY OF OCCUPIER:

It shall be the duty of every occupier of an institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

5. TREATMENT AND DISPOSAL

(1) Bio-medical waste shall be treated and disposed of in accordance with Schedule I, and in compliance with the standards prescribed in Schedule V.

(2) Every occupier, where required, shall set up in accordance with the time-schedule in Schedule VI, requisite bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste, or, ensure requisite treatment of waste at a common waste treatment facility or any other waste treatment facility.

6. SEGREGATION, PACKAGING, TRANSPORTATION AND STORAGE

(1) Bio-medical waste shall not be mixed with other wastes.

(2) Bio-medical waste shall be segregated into containers/bags at the point of generation in accordance with Schedule II prior to its storage, transportation, treatment and disposal. The containers shall be labeled according to Schedule III.

(3) If a container is transported from the premises where bio-medical waste is generated to any waste treatment facility outside the premises, the container shall, apart from the label prescribed in Schedule III, also carry information prescribed in Schedule IV.

(4) Notwithstanding anything contained in the Motor Vehicles Act, 1988, or rules thereunder, untreated biomedical waste shall be transported only in such vehicle as may be authorised for the purpose by the competent authority as specified by the government.

(5) No untreated bio-medical waste shall be kept stored beyond a period of 48 hours Provided that if for any reason it becomes necessary to store the waste beyond such period, the authorised person must take permission of the prescribed authority and take measures to ensure that the waste does not adversely affect human health and the environment.

7. PRESCRIBED AUTHORITY

(1) The Government of every State and Union Territory shall establish a prescribed authority with such members as may be specified for granting authorisation and implementing these rules. If the prescribed authority comprises of more than one member, a chairperson for the authority shall be designated.

(2) The prescribed authority for the State or Union Territory shall be appointed within one month of the coming into force of these rules.

(3) The prescribed authority shall function under the supervision and control of the respective Government of the State or Union Territory.

(4) The prescribed authority shall on receipt of Form 1 make such enquiry as it deems fit and if it is satisfied that the applicant possesses the necessary capacity to handle bio-medical waste in accordance with these rules, grant or renew an authorisation as the case may be.

(5) An authorisation shall be granted for a period of three years, including an initial trial period of one year from the date of issue. Thereafter, an application shall be made by the occupier/operator for renewal. All such subsequent authorisation shall be for a period of three years. A provisional authorisation will be granted for the trial period, to enable the occupier/operator to demonstrate the capacity of the facility.

(6) The prescribed authority may after giving reasonable opportunity of being heard to the applicant and for reasons thereof to be recorded in writing, refuse to grant or renew authorisation.

(7) Every application for authorisation shall be disposed of by the prescribed authority within ninety days from the date of receipt of the application.

(8) The prescribed authority may cancel or suspend an authorisation, if for reasons, to be recorded in writing, the occupier/operator has failed to comply with any provision of the Act or these rules :

Provided that no authorisation shall be cancelled or suspended without giving a reasonable opportunity to the occupier/operator of being heard.

8. AUTHORISATION

(1) Every occupier of an institution generating, collecting, receiving, storing, transporting, treating, disposing and/or handling bio-medical waste in any other manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/service to less than 1000 (one thousand) patients per month, shall make an application in Form 1 to the prescribed authority for grant of authorisation.

(2) Every operator of a bio-medical waste facility shall make an application in Form 1 to the prescribed authority for grant of authorisation.

(3) Every application in Form 1 for grant of authorisation shall be accompanied by a fee as may be prescribed by the Government of the State or Union Territory.

(4) The authorization to operate a facility shall be issued in Form IV subject to conditions laid therein and such other conditions, as the prescribed authority.

9. ADVISORY COMMITTEE

The Government of every State/Union Territory shall constitute an advisory committee. The committee will include experts in the field of medical and health, animal husbandry and veterinary sciences, environmental management, municipal administration, and any other related department or organisation including non-governmental organisations. The State Pollution Control Board/Pollution Control Committee shall be represented. As and when required, the committee shall advise the Government of the State/Union Territory and the prescribed authority about matters related to the implementation of these rules.

10. ANNUAL REPORT

Every occupier/operator shall submit an annual report to the prescribed authority in Form 11 by 31 January every year, to
include information about the categories and quantities of bio-medical wastes handled during the preceding year. The prescribed

authority shall send this information in a compiled form to the Central Pollution Control Board by 31 March every year.

11. MAINTENANCE OF RECORDS

(1) Every authorised person shall maintain records related to the generation, collect ' ion, reception, storage, transporation, treatment, disposal and/or any form of handling of bio-medical waste in accordance with these rules and any guidelines issued.

(2) All records shall be subject to inspection and verification by the prescribed authority at any time.

12. ACCIDENT REPORTING

When any accident occurs at any institution or facility or any other site where bio-medical waste is handled or during transportation of such waste, the authorised person shall report the accident in Form Ill to the prescribed authority forthwith.

13. APPEAL

Any person aggrieved by an order made by the prescribed authority under these rules may, within thirty days from the date on which the order is communicated to him, prefer an appeal to such authority as the Government of State/Union Territory may think fit to constitute :

Provided that the authority may entertain the appeal after the expiry of the said period of thirty days if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

1. COMMON DISPOSAL /INCINERATION SITES

Without prejudice to rule 5 of these rules, the Municipal Corporation, Municipal Boards or Urban Local Bodies, as the case may be, shall be responsible for providing suitable common disposal/incineration sires for the biomedical wastes generated in the area under their jurisdication and in areas outside the jurisdiction of any municipal body, it shall be the responsibility of the occupier generating

SCHEDULE I

(See Rule 5)

CATEGORIES OF BIO-MEDICAL WASTE

Waste Category No.	Waste Category [Type]	Treatment ad Disposal [Option+]
Category No. I	Human Anatomical Waste (human tissues, organs, body parts)	incineration@/deep burial*
Category No. 2	Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal houses)	incineration@/deep burial*
Category No 3	Microbiology & Biotechnology Waste (wastes from laboratory cultures, stocks or specimens of micro-organisms live or Attenuated vaccines, human and animal cellculture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	local autoclaving/micro-waving/incineration@
Category No 4	Waste sharps (needles, syringes, scalpels,	disinfection (chemical treat- ment@01/auto

	blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	claving/micro-waving and multilation/ shredding"
Category No 5	Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)	inc incineration @/destruct ion and drugs disposal in secured landfills
Category No 6	Solid Waste (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)	incineration@ autoclaving/microwa ving
Category No. 7	Solid Waste (wastes generated from disposable items other than the waste [sharps] such as tubings, catheters, intravenous sets etc).	disinfection by chemical treatment@@ autoclaving/microwa ving and multilation/ shredding##
Category No. 8	Liquid Waste (waste generated from laboratory and washing, cleaning, house-keeping and Disinfecting activities)	disinfection by chemical treatment@@ and discharge
Category No. 9	Incineration Ash (ash from incineration of any bio-medical waste)	disposal in municipal landfill
Category No. 10	Chemical Waste (chemicals used in production of biologicals, chemicals used indisinfection, as insecticides, etc.)	chemical treatment@@ and discharge into drains for liquids and secured landfill for solids.

@ Chemicals treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical treatment ensures disinfection.

Multilation/shredding must be such so as to prevent unauthorised reuse.

@ There will be no chemical pretreatment before incineration. Chlorinated plastics shall not be incinerated.

* Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas.

SCHEDULE II
(see Rule 6)

COLOUR CODING AND TYPE OF CONTAINER FOR DISPOSAL OF BIO-MEDICAL WASTES

Colour Conding	Type of Container -I Waste Category	Treatment options as per Schedule I
Yellow	Plastic bag Cat. 1, Cat. 2, and Cat. 3, Cat. 6.	Incineration/deep burial
Red	Disinfected container/plastic bag Cat. 3, Cat. 6, Cat.7.	Autoclaving/Microwaving/ Chemical Treatment
Blue/White translucent	Plastic bag/puncture proof Cat. 4, Cat. 7. Container	Autoclaving/Microwaving/ Chemical Treatment and destruction/shredding
Black	Plastic bag Cat. 5 and Cat. 9 and Cat. 10. (solid)	Disposal in secured landfill

Notes:

1. Colour coding of waste categories with multiple treatment options as defined in Schedule I, shall be selected depending on treatment option chosen, which shall be as specified in Schedule I.

2. Waste collection bags for waste types needing incineration shall not be made of chlorinated plastics.

3. Categories 8 and 10 (liquid) do not require containers/bags.

4. Category 3 if disinfected locally need not be put in containers/bags.

LIST OF BIO MEDICAL WASTE SERVICE PROVIDERS

Sl. No.	Name and Address	Phone No.	E-Mail Address
1.	Haat Supreme Sartech Pvt. Ltd., Vill & P.O. Bazinda Jatan, Carnal.	9316930276,9814895394, 01723043461	
2.	Vulcon Waste Management Co., 1046, Sector-31, Gurgaon	9810663869, 9899616164	
3.	Synergy Waste Management Pvt. Ltd., 168, Sector-27-28, HUDA, IA, Hisar	0112693372	biowaste@indiatimes.com
4.	Ess Kay Hygienic, Panchkula		
5.	S.D.Bio-medical Waste, Rohtak		
6.	Divya Waste Management, Jind		

MINISTRY OF ENVIRONMENT AND FORESTS NOTIFICATION

New Delhi, the 4th February, 2011 S.O.249(E).-

The Plastics (Manufacture, Usage and Waste Management) Rules - 2011

Whereas draft rules, namely, the Plastics (Manufacture, Usage and Waste Management) Rules, 2009 were published by the Government of India in the Ministry of Environment and Forests vide number S.O. 2400(E), dated the 17th September, 2009 in the Gazette of India, Extraordinary of the same date inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of a period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

AND WHEREAS copies of the said Gazette were made available to the public on the 17th day of September, 2009;

AND WHEREAS the objections and suggestions received within the said period from the public in respect of the said draft rules have been duly considered by the Central Government.

NOW, THEREFORE, in exercise of the powers conferred by sections 3, 6, and 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Recycled Plastics Manufacture and Usage Rules, 1999, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following Rules, namely:-

1. Short title and commencement:-

(1) These rules may be called the Plastic Waste (Management and Handling) Rules, 2011.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Applications.-

The provisions of rules 5 and 8 shall not apply to the manufacture of carry bags exclusively for export purposes, by export oriented manufacturing units, against an order for export received by the owner or occupier of the concerned manufacturing unit. This exemption does not apply to any surplus or rejects, left over and the like.

3. Definitions.- In these rules, unless the context otherwise requires.-

(a) **"Act"** means the Environment (Protection) Act, 1986 (29 of 1986);

(b) **"Carry bags"** mean all plastic bags used to carry commodities, including self carrying

features;

(c) **"Commodities"** mean articles; including but not limited to vegetables, fruits, pharmaceuticals, food grains and the like;

(d) "**Compostable plastics"** mean plastic that undergoes degradation by biological processes during composting to yield CO_2, water, inorganic compounds and biomass at a rate consistent with other known compostable materials and does not leave visible, distinguishable or toxic residue; 2

(e) **"Consent"** means the consent to establish and operate from the concerned State Pollution Control Board or Pollution Control Committee granted under the Water (Prevention & Control of Pollution) Act, 1974 (6 of 1974), and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981);

(f) **"Disintegration"** means the physical breakdown of a material into very small fragments;

(g) **"Extended producer's responsibility (EPR)"** means the responsibility of a producer or manufacturer of plastic carry bags and multilayered plastic pouches or packages for the environmentally sound management of the product until the end of its life. This responsibility also applies to all manufactures using such packaging;

(h) **"Food-stuffs"** mean ready to eat food products, fast food, processed or cooked food in liquid, powder, solid or semi-solid form;

(i) **"Manufacturer"** means any producer who manufactures plastic carry bags, multilayered packaging, pouches and the like or uses such materials in packaging of a product;

(j) **"Municipal authority"** means Municipal Corporation, Municipality, Nagar Palika, Nagar Nigam, Nagar Panchayat, Municipal Council including Notified Area Committee (NAC) or any other local body constituted under the relevant statutes and, where the management and handling of municipal solid waste is entrusted to such agency;

(k) **"Multilayered plastics"** mean any material having a combination of more than one layer of packaging material such as paper, paper board, polymeric materials, metalised layers or aluminium foil, either in the form of a laminate or co-extruded structure;

(l) **"Plastic"** means material which contains as an essential ingredient a high polymer and which at some stage in its processing into finished products can be shaped by flow;

(m) **"Plastic waste"** means any plastic product such as carry bags, pouches or multilayered packaging, which have been discarded after use or after their intended life is over;

(n) **"Registration"** means registration of units manufacturing or recycling carry bags made of

virgin or recycled plastics with the concerned State Pollution Control Board or Pollution Control Committee, as the case may be;

(o) **"Virgin plastic"** means plastic material which has not been subjected to use earlier and has also not been blended with scrap or waste;

(p) **"Waste management"** means the scientific reduction, re-use, recovery, recycling, composting or disposal of plastic waste;

(q) **"Waste pickers"** mean individuals or groups of individuals engaged in the collection of plastic waste.

4. Prescribed Authority.-

The prescribed Authority means the Authority3

(a) For enforcement of the provisions of these rules related to authorization, manufacture, recycling and disposal shall be State Pollution Control Board and Pollution Control Committee in respect of Union territory;

(b) For enforcement of the provisions of these rules relating to the use, collection, segregation, transportation and disposal of post consumer plastic waste shall be the concerned municipal authority.

5. Conditions.- During the course of manufacture, stocking, distribution, sale and use of carry bags and sachets, the following conditions shall be fulfilled, namely:-

(a) Carry bags shall either be white or made using only those pigments and colourants which are in conformity with Indian Standard : IS 9833:1981 titled as List of pigments and colourants for use in plastics in contact with foodstuffs, pharmaceuticals and drinking water, as amended from time to time;

(b) No person shall use carry bags made of recycled plastics or compostable plastics for storing, carrying, dispensing or packaging food stuffs;

(c) No person shall manufacture, stock, distribute or sell any carry bag made of virgin or recycled or compostable plastic, which is less than 40 microns in thickness;

(d) Sachets using plastic material shall not be used for storing, packing or selling gutkha, tobacco and pan masala;

(e) Recycled carry bags shall conform to the Indian Standard: is 14534:1998 titled as Guidelines for Recycling of Plastics, as amended from time to time;

(f) Carry bags made from compostable plastics shall conform to the Indian Standard: IS/ISO 17088:2008 titled as Specifications for Compostable Plastics, as amended from time to time.

6. Plastic Waste Management.-

The plastic management shall be as under:-

(a) Recycling, recovery or disposal of plastic waste shall be carried out as per the rules, regulations and standards stipulated by the Central Government from time to time;

(b) Recycling of plastics shall be carried out in accordance with the Indian Standard: IS 14534:1998 titled as Guidelines for Recycling of Plastics, as amended from time to time;

(c) the municipal authority shall be responsible for setting up, operationalisation and coordination of the waste management system and for performing the associated functions, namely:- (i) to ensure safe collection, storage, segregation, transportation, processing and disposal of plastic waste; (ii) to ensure that no damage is caused to the environment during this process; (iii) to ensure setting up of collection centres for plastic waste involving manufacturers; (iv) to ensure its channelisation to recyclers; (v) to create awareness among all stakeholders about their responsibilities; (vi) to engage agencies or groups working in waste management including waste pickers, and (vii) to ensure that open burning of plastic waste is not permitted; (d) for setting up plastic waste collection centres, the municipal authority may ask the manufacturers, either collectively or individually in line with the principle of Extended 4 Producer's Responsibility (EPR) to provide the required finance to establish such collection centre; (e) recyclers shall ensure that recycling facilities are in accordance with the Indian Standard: IS 14534:1998 titled as Guidelines for Recycling of Plastics and in compliance with the rules under the Environment (Protection) Act, 1986, as amended from time to time; (f) the concerned municipal authority shall ensure that the residues generated from recycling processes are disposed of in compliance with Schedule II (Management of Municipal Solid Wastes) and Schedule III (Specifications for Landfill Sites) of the Municipal Solid Wastes (Management and Handling) Rules, 2000 made under the Environment (Protection) Act, 1986, as amended from time to time; (g) the municipal authority shall incorporate the said rules in the Municipal bye laws of all the Urban Local Bodies; (h) The municipal authority shall encourage the use of plastic waste by adopting suitable technology such as in road construction, co-incineration etc. The municipal the operator intending to use such technology shall ensure the compliance with the prescribed standards including pollution norms prescribed by the competent authority in this regard.

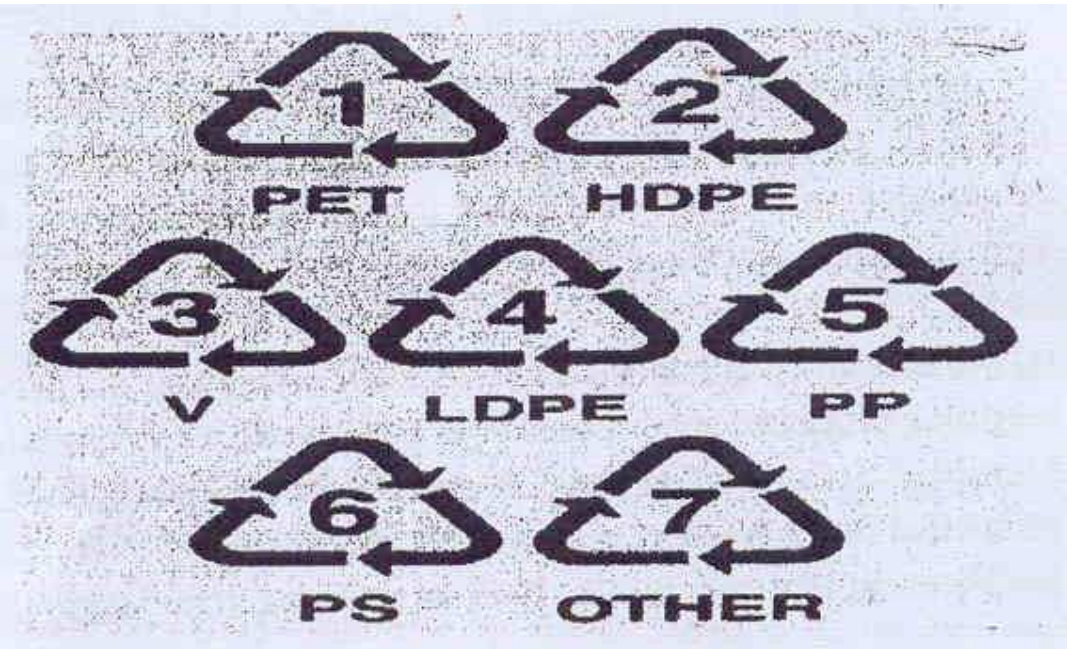
7. Protocols for Compostable Plastic Materials. – Determination of the degree of degradability and degree of disintegration of plastic material shall be as per the protocols of

the Indian Standards listed in the Annexure to these rules.

8. Marking or Labelling.-

(a) Each plastic carry bag and multilayered packaging shall have the following information printed in English or in local language, namely;- (i) name, registration number of the manufacturer and thickness in case of carry bag; (ii) name and registration number of the manufacturer in case of multilayered packaging.

(b) Each recycled carry bag shall bear a label or a mark "recycled" as shown below and shall conform to the Indian Standard: IS 14534:1998 titled as Guidelines for Recycling of Plastics, as amended from time to time; 5



Note: PET–Polyethylene terephthalate, HDPE–High density polyethylene, V– Vinyl (PVC), LDPE–Low density polyethylene, PP–Polypropylene, PS– Polystyrene and other means all other resins and multi-materials like ABS (Acrylonitrile butadiene styrene), PPO (Polyphenylene oxide), PC (Polycarbonate), PBT (Polybutylene terephalate) etc.

(c) Each carry bag made from compostable plastics shall bear a label "compostable" and shall conform to the Indian Standard: IS/ISO 17088:2008 titled as Specifications for Compostable Plastics;

(d) Retailers shall ensure that plastic carry bags and multilayered packaging sold by them are properly labelled, as per stipulations under these rules.

9. Registration of Manufacturers and Recyclers.-

(a) Any person manufacturing or proposing to manufacture carry bags and multilayered plastics shall apply to the State Pollution Control Board (SPCB) or Pollution Control Committee (PCC) of the Union territory concerned for the grant of registration or for the renewal of registration for the manufacturing unit using Form 1 appended to these rules;

(b) aAny person recycling or proposing to recycle carry bags or multilayered plastics or any plastic waste shall apply to the SPCB or PCC for grant of registration or renewal of registration for the recycling unit using Form 2 appended to these rules;

(c) No person shall manufacture carry bags or recycle plastic bags or multilayered plastics unless without obtaining the registration certificate from the SPCB or PCC, as the case may be, prior to the commencement of production;

(d) The SPCB and PCC shall not issue or renew a registration for manufacturing or recycling units unless the unit possesses a valid consent under the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and certificate of registration issued by the District Industries Centre or any other Government agency authorized in this regard;

(e) Every State Pollution Control Board or Pollution Control Committee shall take a decision on the grant of registration within ninety days of receipt of an application that is complete in all respects; 6

(f) The registration granted under this rule shall be valid for a period of three years, unless revoked, suspended or cancelled; and registration shall not be revoked, suspended or cancelled without providing the manufacturer an opportunity for a hearing;

(g) Every application for renewal of registration shall be made at least ninety days before the expiry of the validity of the registration certificate.

10. Explicit pricing of carry bags.-

No carry bags shall be made available free of cost by retailers to consumers. The concerned municipal authority may by notification determine the minimum price for carry bags depending upon their quality and size which covers their material and waste management costs in order to encourage their re-use so as to minimize plastic waste generation.

11. State Level Advisory Body.-

(1) There shall be a State Level Advisory Body to monitor the implementation of these Rules.

(2) The State Level Advisory Body shall consist of the following persons, namely:-

(a) the Secretary, Department of Urban Development - Chairman

(b) one expert from State Department of Environment - Member

(c) one expert from State Pollution Control Board or

Pollution Control Committee - Member

(d) one expert from Urban Local Body - Member

(e) one expert from Non-Governmental Organisation - Member

(f) one expert from the field of Industry - Member and

(g) one expert from the field of academic institution - Member

(3) The State Level Advisory Body shall meet at least once in a year and may invite experts, if it considers necessary.

12. Annual Reports.-

(1) Each State Pollution Control Board or Pollution Control Committee shall prepare and submit the annual report to the Central Pollution Control Board on the implementation of these rules by the 30th day of September of each year;

(2) The Central Pollution Control Board shall prepare a consolidated annual report on the use and management of plastic waste and forward it to the central government along with its recommendations before the 30th day of December each year.

[F.No. 17-2/2001-HSMD]
RAJIV GAUBA. Jt. Secy.

E-waste (Management and Handling) rules, 2011

There is a new E-waste rule which has just been legislated. It will come into effect from May 1st 2012. Starting 1st May 2012, it will be illegal to dump an old TV, mobile or laptop into the garbage bin or sell any of these to the local scrap dealer. Under the Electronic Waste (Management and Handling) Rules, 2011, such waste must be routed to one of only 73 authorized recyclers (like Eco Raksha) in India.

The Recycle route

* Call up manufacturer or check on their website if they have any authorized collection centres

* Check with manufacturer for incentives on buybacks, some offer discounts on next purchase

* Check if local scrap dealers have any authorisations from the Pollution Control Board

Non-compliance can entail imprisonment or a fine. As of now, these penalties are only for manufacturers and bulk consumers. Under this rule, some of the Key sections / definitions which would be relevant are collated for your convenience.

Definitions

'e-waste'means waste electrical and electronic equipment, whole or in part included in, but not confined to equipment listed in Schedule-I and scraps or rejects from their manufacturing process, which is intended to be discarded.

'bulk consumer' means bulk users of electrical and electronic equipment such as Central or State Government Departments, Public sector undertakings, banks, Private companies, Educational institutions, Multinational organizations and others that are registered under the Factories Act 1948, Companies Act 1956 or the Societies Registration Act 1860, and the Micro, Small and Medium Enterprises Development Act, 2006 including the international agencies;

'producer' means any person who, irrespective of the selling technique used;

- manufactures and offers to sale electrical and electronic equipment under his own brand; or
- offers to sale under his own brand, the assembled electrical and electronic equipment produced by other manufacturers or suppliers; or
- offers to sale imported electrical and electronic equipment;

'**extended producer responsibility**' (EPR) means responsibility of any producer of electrical

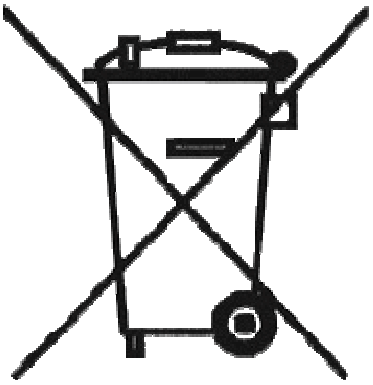
or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end-of-life products.

Responsibilities of consumer or bulk consumer

1. Consumers of electrical and electronic equipment shall ensure that e-waste are deposited with the dealer or authorized collection centers.
2. Bulk consumers of electrical and electronic equipment shall ensure that e-waste are auctioned to or deposited with the dealer or authorized collection centers or refurbisher or registered dismantler or recyclers or avail the pick-up or take back services provided by the producers; and
3. Bulk consumers shall file annual returns in Form 3, to the concerned State Pollution Control Board or Pollution Control Committee on or before the 30th day of June following to the financial year to which that return relates.
4. Every producer(s), dealer(s), collection centre(s), refurbisher(s), dismantler(s), recycler(s), auctioneer(s) consumer(s) or bulk consumer(s) shall not import used electrical and electronic equipment in India for use

Responsibilities of the producer

1. Collection of e-waste generated during the manufacture of electrical and electronic equipment and channelizing the same for recycling or disposal.
2. Collection of e-waste generated from the 'end of life' of their products in line with the principle of 'Extended Producer Responsibility' (EPR), and to ensure that such e-wastes are channelized to registered refurbisher or dismantler or recycler.



3. Setting up collection centers or take back system either individually or collectively for all electrical and electronic equipment at the end of their life.
4. Financing, and organizing a system to meet the costs involved in the environmentally sound management of e-waste generated from the 'end of life' of its own products and historical waste available on the date from which these rules come in to force. Such financing system shall be transparent. The producer may choose to establish such financial system either individually or by joining a collective scheme.
5. Providing contact details such as address, telephone numbers/helpline number and e-mail of distributors and authorized collection centers to consumer(s) or bulk consumer(s) so as to facilitate return of used electrical and electronic equipment.

6. Creating awareness through publications, advertisements, posters, or by any other means of communication and information booklets accompanying the equipment, with regard to the following:
    - information on hazardous constituents in e-waste electrical and electronic equipment;
    - information on hazards of improper handling, accidental breakage, damage and/or improper recycling of e-waste;
    - instructions for handling the equipment after its use, along with the Do's and Don'ts;
    - affixing the symbol given below on the products to prevent e-waste from being dropped in garbage bins containing waste destined for disposal;
7. Obtaining an authorization from the concerned State Pollution Control Board or Pollution Control Committee in accordance with the procedures prescribed under rule-11;
8. Maintaining records in Form 2 of the e-waste handled Such records should be available for scrutiny by the appropriate authority.
9. Filing annual returns in Form 3, to the concerned State Pollution Control Board or Pollution Control Committee, on or before the 30th day of June following to the financial year to which that return relates.

Appendix 2

Illustrative list of bio-degradable and recyclable waste

Biodegradable Waste	Recyclable waste
"**biodegradable waste**" means "wet" waste of plant and animal origin.	**"recyclable waste"** means "dry" waste that can be transformed through a process into raw materials for producing new products, which may or may not be similar to the original products.
♦ Kitchen Waste including: tea leaves, egg shells, fruit and vegetable peels ♦ Meat and bones ♦ Garden and leaf litter, including flowers ♦ Animal litter ♦ Soiled paper ♦ House dust after cleaning ♦ Coconut shells ♦ Ashes	♦ Newspapers ♦ Paper, books and magazines ♦ Glass ♦ Metal objects and wire ♦ Plastic ♦ Cloth Rags ♦ Leather ♦ Rexine ♦ Rubber ♦ Wood /furniture ♦ packaging

Normative standards

Normative standard for Door To door Collection

Auto tipper:

- One Auto tipper shall be assigned for every 1000 households
- A Auto tipper shall collect waste from 500 households/trip thereby having two trips/ day
- One driver with one helper shall be assigned per auto tipper.
- The Auto tipper shall be well maneuverable, diesel fuel 3or 4 wheel auto chassis, equipped with tipping hopper of capacity 1.5 cubic meter and above, having lids which

can be tipped using a hydraulic arrangement and be adequate for direct transfer to the compactors.

- The vehicle should be suitable for moving in narrow lanes.
- Painting Inside and outside of the vehicle will be painted with enamel paint.
- The auto tippers shall meet with speed governor as per the existing RTO regulation.

Pushcart:

- One pushcart shall be assigned for every 180 to 200 households/day
- A Pushcart shall collect waste from 60 households/ trip there by doing three trips/day.
- One worker shall be deployed per pushcart.
- Pushcart designed to accommodate 4 HDPE bins of 40 liters capacity fabricated out of M.S Angles and flats for door to door collection, for road side and street waste collection for pushing by hand on patchy roads. The pushcarts should be painted with Anti corrosive paints to make it corrosive free for longer performance life.

Normative standard for Street Sweeping

The roads need to be classified into three categories.

- Type A: Manual sweeping
- Type B: Mechanical Sweeping
- Type C: Night sweeping
- All roads, streets to be brought under daily sweeping by manually (70%) and will be classified as A Type, which includes all the residential areas
- Major and VVIP, VIP roads to be swept by Mechanical Sweeper Equipments (20%) and will be classified as B Type.
- Arterary and Commercial Areas to be cleaned during Night time (10%) and will be classified as C: Type.

For manual sweeping

In,High density Area:1 Person with 1 Push cart for 500 mts running length on both sides in a day.

Medium density Area: 1 person with 1 push cart for 750 mt running length on both sides and

Low density: 1 person with 1 push cart for 1000 mt running length both sides.

Mechanical Sweeper:

35 to 50 Km stretch in a day for carriage way, Median edges, footpath, edges sweeping and cleaning by one heavy duty Mechanical Sweeper Equipment Vehicle.

Normative Standards for Secondary Storage

The secondary storage containers having a capacity of 7 m3, 10 m3 and 15 m3.

- 7 , 10 & 15m3 Hook Loaded compactors are proposed for large markets.
- 1.1 m3 Universal Bin Loaders is proposed for small markets.
- On the basis of weight, the capacity of secondary containers are as follows:

  7m3 :5.6 tons

  10 m3 :8.0 tons

  15 m3: 12.0 tons

- The secondary containers are to be identified based on the volume of waste generated in the market.
- The Secondary Containers are to be placed on a pre-cast cement concrete floor.

Normative Standards for Segregation Bins / Bags for Storage on Premises

Levels	**At the points of generation** , like the individual home , a room in the Hostel, in the shop floor, **At the points of storage** for collection like on the campus, premises, complex
Capacity of Bins	Residentia Every l Unit : 5/12/20 Litres / upto 12 kgs Non Residential Every 5000sq feet : 60 Litres / 40 kgs Every 30 people : 240Litres / 96 kgs Every 120 kgs generated : 360Litres/ 136 kgs ** Waste Bins capacity must be 20% more than the waste generated ** Waste Bins must have a lid cover
Information	The Bin facilities are available on the premises should be prominently displayed For the information of the residents, customers, users
Displays	The type waste that should be disposed off in each bin should be clearly displayed through use of informative labeling

Appendix 3

Levy of fines/penalty

(Schedule I below for every instance of breach of these Rules and thereafter, on a daily basis, for repeat offences.)

Schedule – I (Schedule of Fines) on General Public

SI No	Sub-division / Description of Rule	Amount of Fine applicable for breach of Rule
1	Littering	Rs. 100
2	Spitting	Rs. 50
3	Bathing	Rs. 50
4	Urinating	Rs. 50
5	Defecating	Rs. 50
6	Feeding groups of animals/birds in non-designated areas	Rs. 50
7	Washing vehicles	Rs. 100
8	Washing utensils /clothes/any other object	Rs. 50
9	For not maintaining Swacha Aangana: for a) for owners / occupiers of single premises b) for others	 Rs. 100 Rs.1000
10	For delivering waste that is not segregated and stored as specified in separate bins: a) individual b) bulk generator	 Rs. 100 Rs. 500
11	For not delivering bio-degradable waste in a segregated manner as specified	Rs.100
12	For non-composting by bulk generators or in new constructions within 6 months of these Rules, and for others when applicable	Rs. 100/day
13	For not delivering specified household hazardous waste in a segregated manner as specified	Rs. 500
14	For not delivering biomedical waste in a segregated manner as specified	Rs. 500

15	For not delivering Construction and Demolition waste in a segregated manner as specified	Rs. 1000
16	For not delivering "dry" waste in a segregated manner as specified	Rs. 100
17	For not delivering garden waste and tree trimmings as specified	Rs. 1000
18	For depositing waste outside designated community waste storage bin or in any non-designated area	Rs. 100
19	For disposal of waste by burning	Rs. 500
20	For not delivering (non-household) fish, poultry and meat waste in a segregated manner as specified	Rs. 500
21	a) For a vendor/hawker without a container/waste basket	Rs. 100
	b) For a vendor/hawker who does not deliver waste in a segregated manner as specified	Rs. 100
22	a) For not keeping a house gully clean	Rs. 1000
	b) For not delivering solid waste from a house gully in a segregated manner as specified	Rs. 500
23	For littering by pet/owned animals	Rs. 50
24	For not cleaning-up after public gathering/event within 24 hours	Forfeiture of the Cleanliness Deposit

Penalty for Collection and Transportation Service Provider

Sl No	Item	Penalty in Rupees
1	Complaint of Non segregation and non collection of Segregated MSW (wet & dry separately)) even for a single day from households, commercial establishments etc (10% of the total households, commercial establishments)	5% of the day contract value
2	Complaint of Non collection of MSW from designated locations and transportation to Dry waste collection centre/compost facility and / landfill, even for a single day.	5% of the day contract value
3	Complaint of Not carrying out sweeping of streets, footpaths, pavements, and cleaning of roadside drains and transportation of the same to the designated locations even for a single day.	5% of the day contract value
4	Complaint of Non collection of MSW from bulk generators and transportation to designated locations, even for a single day	5% of the day contract value

5	Not providing the vehicles and equipment as specified, even for a single day.	5% of the day contract value
6	Cleaning of burial grounds, removal of MSW from vacant sites open space, of BBMP owned buildings etc., as per implementation plan per instance.	5% of the day contract value
7	Transportation of carcasses within 2 hours after notification by BBMP per instance	5% of the day contract value
8	Burning of MSW or Plastic	5% of the day contract value
9	Non Collection of e-waste and bulk waste generated from households and other establishments as specified.	5% of the day contract value
10	Non performance of any other obligation under the agreement for a continuous period of 3 days	5% of the day contract value
11	If the Penalty amounts as payable by the Service Provider is equal or greater than 5% of the monthly Contract Value for continuous period of three months or more.	Termination of the contract by forfeiting the Performance security, black listing the contractor.