Recommendations for Long Term Action Plan for Solid Waste Management in Delhi

Recommendations prepared in compliance with directive of the Hon'ble Delhi High Court vide its order dated 28.06.2017 in case of Gauri Grover v. Government of NCT Delhi, W.P. (C) 8917/2015

2 August, 2017

The Hon'ble Delhi High Court vide its order dated 28.06.2017 in case **Gauri Grover v. Government of NCT of Delhi,** W.P. (C) 8917/2015, constituted a Committee under the Chairmanship of Member Secretary, Delhi State Legal Services Authority ('DSLSA') to formulate and implement long term action plan regarding collection, removal and disposal of all waste in Delhi.

Pursuant to the said direction, meetings of the Committee were held at the Office of DSLSA. It is humbly submitted that to deal with the aspect of solid waste management ('SWM'), the Central Government has made the Solid Waste Management Rules, 2016. These rules have dealt with the issue of solid waste management comprehensively. The rules inter-alia provide for several measures to manage the solid waste and procedures to be followed for collection, removal and disposal of solid waste.

The Hon'ble National Green Tribunal has also dealt with the issue of solid waste management in **Kudrat Sandhu v. Govt. of NCT & Ors.,** OA No. 281/2016 and **Mrs. Almitra H. Patel and Union of India & Ors.,** OA No. 199/2014 and passed elaborate directions to the concerned agencies dealing with the issue vide order dated 02.12.2016 and 22.12.2016 (corrected order dated 02.01.2017) respectively [Excerpts of the directions have been placed at Annxure 'A' and Annxure 'B'].

The tribunal has observed in its order dated 22.12.2016 that 'with the framing of the Rules all that remains to be done is an effective enforcement of the said Rules and possible upgradation of technology wherever necessary. Enforcement of the Rules and efforts to upgrade the technology relevant to the handling of solid municipal waste is a perennial challenge and would require constant efforts and monitoring with a view to making the municipal authorities concerned accountable, taking note of dereliction, if any, issuing suitable directions consistent with the said Rules and direction incidental to the purpose underlying the Rules such as upgradation of technology wherever possible'.

This committee has discussed the existing system prevailing for collection, removal and disposal of solid waste in Delhi. It has flagged the major challenges concerning waste management and suggested measures for improvement in segregation, collection, removal and disposal of solid waste.

A. Major challenges concerning solid waste management in Delhi

The following major challenges were highlighted concerning solid waste management:

i. **Infrastructure for segregation:** At present, mixed waste is usually collected and sent to the dump-sites/waste to energy (WtE) plants/compost plants. Effective system of waste segregation is required at appropriate stages i.e. source of waste generation, collection, transportation, processing and disposal.

ii. **Waste management in unauthorized areas and slums:** Delhi has 1634 unauthorised colonies in three MCDs' jurisdictional area. These unauthorised colonies are not developed in accordance with the city planning norms. These unplanned colonies pose a major challenge for waste collection and transportation as well. Even though, by the statutory provisions, the municipal bodies are responsible for extending waste management services to these households. In SDMC, there are 932 unauthorised colonies where the corporation presently provides only sanitation related activities. As per the orders of GNCT of Delhi, the development works in unauthorised colonies is entrusted to the Delhi State Industrial & Infrastructure Development Corporation (DSIIDC). Until road construction, drainage, sewerage and other allied works are undertaken, the waste collection would remain a major issue in these colonies. Moreover, no bins are placed and no dhalaos exist in such areas. Hence, issues of littering and blockage of drains persist in these areas

iii. **Waste generation on roadside by street vendors/hawkers:** Hawkers and roadside eateries generate garbage throughout the day and dump them on the roadside. Poor vigilance and monitoring by the local authorities aggravates the problem.

iv. **Waste from fruit and vegetable markets:** There is no in-house treatment of wet waste generated in fruit and vegetable markets including mandis.

v. **Inventorisation of waste:** There is no clear idea about how much waste Delhi generates. Further, figures do not keep into account the quantum of garbage managed by the informal sector.

vi. **Optimisation/Increased participation of informal sector:** Waste pickers/informal waste collectors form a vital part of solid waste management. But they are not authorized/registered yet. Local Authorities should integrate informal sector in their waste management systems to strengthen their collection systems.

vii. **Processing of mixed waste:** As per abovementioned order dated 22nd December 2016 of the Hon'ble National Green Tribunal, a Waste to Energy plant based on mass incineration, besides having low efficiency of waste to energy conversion, is contrary to the Rules of 2016 which requires segregation at source. Rule 21(1) of SWM Rules mandates that 'non-recyclable waste having calorific value of 1500 K/cal/kg or more shall not be disposed of on landfills and shall only be utilized for generating energy either or through refuse derived fuel or by giving away as feed stock for preparing refuse derived fuel'. The abovesaid order of NGT and Rule 21(1) of SWM Rules, 2016 need to be followed by the local authorities while processing mixed waste.

viii. **Grim status of dumpsites:** All the three existing landfills of Delhi (Okhla, Bhalswa, Gazipur) have exceeded their capacities way back in 2008. The dumping sites in Delhi do not have any methanisation or gasifiers to control the methane being produced naturally by the biodegradable garbage. There are no fire protection systems at these sites, thus making them a potentially flammable location. As per experts present in the committee, most of these sites have contaminated the aquifers and groundwater in and around their neighbourhood. There is urgent need to promote decentralized processing systems and minimise the use of land for dumping garbage.

ix. **Availability of Land:** There is an issue raised by the local authorities that they do not have appropriate land for processing and disposal of solid waste.

x. **Bye-laws as per SWM Rules, 2016:** Unauthorised disposal of waste in vacant plots and open areas is a big issue in the Municipal Areas. Construction material and malba on account of construction activities stacked on the roads of other agencies like PWD, DDA etc. causes hindrance on the roads for collection and transportation of the waste. So far, a fine of Rs. 50/- is imposed for littering under the DMC Act, 1957, which is too low and needs to be revised. Under SWM Rules, 2016, the local authorities have been mandated to frame bye-laws [See Rule 15 (e) and Rule 15 (zf)] but they have not been framed yet. These bye-laws will have inclusion of user charges, penalties for non-segregation and fines for littering etc.

xi. **Public awareness and behaviour change:** There is lack of public awareness about sanitation and cleanliness of the city. So far, no aggressive campaign has been undertaken by the local authorities to encourage people to keep their city clean. There is an urgent need to start such campaigns and encourage behavioural changes amongst the public.

xii. **Lack of compliance and enforcement capacities:** There is lack of supervisory staff to oversee operations of solid waste management which is a big challenge. Also, there is no Nodal Officer/s designated by local authorities to monitor the progress of waste management i.e. to oversee segregation, efficient Collection and Transportation (C&T) systems, processing of segregated waste and proper disposal which is in accordance with SWM Rules.

Refer to Annexure 1 for Existing Status of Waste Management in Delhi.

B. Suggestions to strengthen existing waste management systems in Delhi

1. Operationalise segregation at source

1.1 Generator to segregate at source:

1.1.1 Every owner and occupier of premises within the Municipal Area will have the duty to have the premises clean. The owners and occupiers of premises within the Municipal Area shall segregate waste under three categories as per the SWM Rules, 2016:

- Organic or bio-degradable wastes (called wet waste)
- Recyclable or non-biodegradable wastes (called dry waste)
- Domestic hazardous wastes

1.1.2 Each and every owner and occupier of commercial or residential area, apartment owner/societies, institutions, industries etc. shall maintain two types of 'Dustbins', i.e. 'Green' for storing wet waste and 'Blue' for storing dry waste. The dustbins shall have lid over them.

1.1.3 The Local Authorities may consider providing, for one time, one bin for wet waste and one bin for dry waste storage to individual households, RWAs, DDA flats, approved colonies, low income groups, JJ colonies and slums lying within the Municipal Area.

1.1.4 The domestic hazardous waste like discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles and syringes and contaminated gauge, etc., generated at the household level shall be stored separately in a bag and be given separately to waste collector every day in areas where segregation is already happening. In other areas, it shall commence by 8th April, 2018 positively. [Refer time frame provided under Rule 22 of SWM Rules, 2016]

1.1.5 Sanitary waste, as defined under the SWM Rules, 2016, generated at the household level shall be wrapped in paper and handed over separately to waste collector everyday in areas where segregation is already happening. In other areas, it shall commence by 8th April, 2018 positively. [Refer time frame provided under Rule 22 of SWM Rules, 2016]

1.2 Incentivise segregation at source: In order to push and encourage on-source segregation, local authorities may consider creating system for incentives, which may not be necessarily through any financial means or products. Incentives may be like awarding and recognizing the households by giving certificates, by publishing their names on respective websites or reduction in property tax etc.

1.3 The role and responsibility of generators to segregate solid waste at source has been described through the following table giving timelines for compliance:

Table 1

User's category	Responsibility	Timeline
Households/ Approved Colonies	To compulsorily segregate into wet, dry and domestic hazardous waste	April 8, 2018 (As per SWM Rules 2016, a time line of two years was provided to all urban local bodies starting from April 8, 2016)
RWAs and Market Associations	To segregate at source, create systems to treat wet waste at source, channelize dry waste to recyclers, only inert and non-recyclable waste to be collected from these areas by local authorities	Local authorities to ensure compliance with immediate effect. [Rule 4(6)]
Gated communities and institutions with more than 5000 sq.mtr. area	To segregate at source, create systems to treat wet waste at source, channelize dry waste to recyclers, only inert and non-recyclable waste to be collected from these areas by local authorities	Local authorities to ensure compliance with immediate effect. [Rule 4(7)]
All hotels and restaurants,	To segregate at source, compulsorily create systems to treat wet waste at source, channelize dry waste to recyclers, only inert and non-recyclable waste to be collected from these areas by local authorities	Local authorities to ensure compliance with immediate effect. [Rule 4(8)]
Street Vendors	To segregate waste into wet and dry and transfer the waste every day to the nearest municipal litter bin or in a collection vehicle designated by local authorities	April 8, 2018
Meat, Fish and Poultry Shops	Slaughter waste from meat, poultry and fish shops shall be stored separately in a bin and transferred every day to the nearest municipal litter bin or in a collection vehicle designated by local authorities	April 8, 2018
Other shops including paan shops, etc.	To segregate waste into wet and dry and transfer the waste every day to the nearest municipal litter bin or in a collection vehicle designated by local authorities	April 8, 2018

1.4 The experts in the Committee have made the following recommendations for other users' category:

Table 2

User's category	Responsibility	Timeline
Marriage halls, event sites, public grounds	Marriage/event halls shall take permission from the local authority minimum 7 working days prior to the date of event/ function and shall make the arrangement for segregation and storage of waste at the place of event/function. The segregated waste shall be handed over to waste collector. The local authorities shall charge user fee for collection of segregated waste after the function/ event. In case of non-compliance, fine as per the revised bye-laws shall be levied.	Local authorities shall ensure compliance with immediate effect.

Commercial offices, Government offices, Banks, Insurance offices, Coaching Classes, Educational Institutions.	To segregate at source, push for decentralized treatment composting/ biomethanisation, channelize dry waste to recyclers, only inert and non-recyclable waste to be collected from these areas by MCD	Local authorities shall ensure compliance with immediate effect.
Guest Houses, Hostel, Dharmshalas etc.	To segregate at source, create systems to treat wet waste at source, channelize dry waste to recyclers, only inert and non-recyclable waste to be collected from these areas by MCD	Local authorities shall ensure compliance with immediate effect.

2. Local Authorities to strengthen systems for collection, transportation and processing of the segregated waste

2.1 All local authorities shall submit a roadmap for taking steps to strengthen segregation, collection, transportation and processing in Delhi by 31st August, 2017. The roadmap shall include the following:

- Enforcement of segregation of waste
- Ward by ward mapping and coverage to ensure segregation at source
- Building awareness of households
- Distribution of bins
- Monitoring of progress to achieve the desired objectives
- Ensuring compliances from bulk generators
- Ensuring compliances from street vendors
- Creating infrastructure to collect segregated waste
- Training of waste collectors
- Ensuring compliances over processing of segregated streams

2.2 Local authorities shall train all collectors (formal and informal) to collect segregated waste from households and municipal areas.

2.3 In some areas, local authorities have adequate availability of Safai Karamcharis and thus, they may explore to redeploy street sweepers for doorstep collection of segregated waste.

2.4 Local authorities shall either create partition in existing vehicles used for waste collection or procure vehicles that have partition to collect segregated waste.

2.5 Local authorities shall develop an effective system to collect and transfer segregated waste for processing in a phased manner with immediate effect and give an action plan to ensure proper collection and transportation of segregated waste.

2.6 The segregated wet waste from each house, shop, commercial areas, hotel, restaurants, street bins, educational institutes and all other generators of solid waste in the city shall be collected, if not processed at source, by the local authorities on a regular basis and taken to the nearest processing facility.

2.7 Presently, collection is done through formal as well as informal sectors. The local authorities shall allow both the systems to sustain in the city and upscale the informal sector by issuing identity cards, registration of informal workers by providing them designated space for segregation and sorting.

2.8 The collector shall be directed not to collect unsegregated waste from households. On the report of collector, Sanitary Inspector/Asstt. Sanitary Inspector/any other authorized official/person may take punitive action for non-segregation of waste by the generators.

2.9 Local authorities shall forthwith develop and execute a plan to collect segregated streams of waste every day in colonies/RWAs/households that have started segregation.

2.10 Provision of litter bins in public areas:

2.10.1 It shall be the responsibility of the local authorities to provide adequate number of litter bins at commercial areas and at all important public places such as places of worship, parks, bus-stand, railway station, etc. At each location two types of litter bins shall be provided; 'Green' for disposing wet wastes and 'Blue' for disposing dry waste.

2.10.2 In commercial areas, slums, JJ colonies and important public places, litter bins shall be placed every 100 meters by the local authorities. In other areas, they shall be placed every 300 meters.

2.11 Enhance accountability and transparency: Local authorities shall develop a Management Information System (MIS) on its website that shall give details of waste collection on a daily basis, percentage of segregated waste collected along with percentage of waste processed. This information shall be made available on a public domain. This shall also help to track progress on a weekly or fortnightly or monthly basis in terms of percentage of segregation, collection and processing efficiency in each local authority.

2.12 Designated nodal officer/s, not below the rank of Additional Deputy Commissioner or equivalent, shall be appointed by each civic body to monitor the progress of the segregation, collection, transportation, processing and disposal.

3. Develop decentralized - semi-decentralised systems for processing and disposal

3.1 Local authorities shall allow only the non-usable, non-recyclable, non-bio-degradable, non-combustible and non-reactive inert waste and pre-processing rejects and residues from waste processing facilities to go to sanitary landfill and the sanitary landfill sites shall meet the specifications as given in Schedule-I. However, every effort shall be made to recycle or reuse the rejects to achieve the desired objective to zero waste going to landfill. [Refer Rule 15(zi)]

3.2 Local authorities shall alleviate processing capacity to about 10000 TPD by adoption of appropriate waste management systems including by promotion of decentralized or semi-decentralised waste management systems in the city and also submit a three year phased action plan to execute this.

3.3 Each civic body shall give detailed plan describing the technology adopted for processing, reasons thereof and time lines for its commissioning.

3.4 Local authorities shall encourage generator to treat wet waste at source and may consider creating systems for incentives, which may not be necessarily through any financial means or products, for adoption of decentralized technologies such as biomethanisation, composting etc. Incentives may be like awarding and recognizing the households, RWAs and institutions etc. by giving certificates, by publishing their names on respective websites or reduction in property tax etc.

3.5 Create market linkages for compost: In order to incentivise households that are treating wet waste at source through composting, civic body shall arrange a system to procure compost and give coupons that can be used in all Mother Dairy/Safal counters or similar outlets. On a trial basis, this model can be run in a few RWAs in each local authority.

3.6 Local authorities shall prepare a timely plan for remediation and bio-mining of the existing dumpsites.

3.7 The tipping fee, wherever payable to the concessionaire/operator of the facility, shall not only be relatable to the quantum of waste supplied to the concessionaire/operator but also to the efficient and regular collection of segregated waste.

3.8 Landfill tax: In order to reduce dependence on land, and disincentivise dumping in land, all local authorities shall create a system of landfill tax within five years.

3.9 The processing and disposal methods for segregated waste streams have been explained through following table:

Table 3

Segregated Stream	Processing and disposal
Wet waste management	
Household wet waste	• Local authorities would initiate steps to make the technologies, for adoption of composting/ biomethanation technologies for wet waste management at source, affordable for households/DDA flats/gated societies • Local authorities shall provide list of vendors for composting, biomethanisation on its website along with their contact details. • Local authorities shall engage regularly with RWA's, local NGOs, action groups to push for treatment of wet waste at source. • Local authorities shall create systems to incentivize households that compost at source by creating market linkages.
Mandis/ fruit and vegetable markets	Bio-degradable waste from fruit and vegetable markets should be processed through composting or bio-methanation within the premises with immediate effect.
Cow-sheds/dairy associations	To have bio-methanation plants within the premises with effect from April 8, 2018.
Schools, Colleges, Educational Institutions, Government Institutions	To compulsorily adopt decentralized waste management with immediate effect.
3 star and above hotels and restaurants having >50 seating capacity	To adopt a Zero Waste Policy, to treat wet waste in house, and channelize dry recyclable waste for recycling with immediate effect. Experts are of the opinion that local authorities shall number commercial centres in order to spot check segregation and levy fines in-case of non-compliance.

Dry waste management	• Local authorities shall prepare a rate-sheet for recyclable dry waste for Delhi and share it on its website. • Local authorities shall also push concessionaire to come into a formal contract with the waste collector and a rate list be fixed to take items from households, these records shall be maintained to increase accountability and transparency. • Local authorities shall authorize recyclers/ dealers operational in the Municipal Areas and share the list on its website. • Over a period of fixed time frame, local authorities shall convert existing dhalaos into material recovery facilities/ solid waste processing centres. • Local authorities shall rope in informal sector for secondary sorting of dry waste in these centres. • Local authorities shall maintain record sheets of the quantum of dry waste brought to these centres and the quantity transported to authorized recyclers/dealers. • Sales/distribution of plastic carry bags below 50 microns thickness shall be prohibited in the Municipal Area as per the Plastic Waste Management Rules, 2016. • Persons/establishments found to sell or distribute plastic carry bags below 50 microns thickness shall be prosecuted as per the provisions of the Plastic Waste Management Rules, 2016.
Horticultural/Green Waste	• Horticultural waste (garden waste) generated in residential and commercial areas, public parks should be segregated and composted in garden or parks, wherever it is feasible. • Wherever composting of horticultural waste is not possible in public parks or gardens, local authorities shall be responsible for collection and composting of horticulture wastes from public parks and gardens. • Tree leaves from trees on the roads and other public spaces shall also be collected and composted by the concerned authority having jurisdiction over it.
Construction and Demolition Waste	• It shall be the responsibility of the owner/ occupier of premises to store the construction material and construction and demolition (C&D) waste within the premises. • It shall be the responsibility of the owner/ occupier of premises to dispose C&D waste at a place designated by the MCD or to the nearest C&D facility. The C&D waste shall be processed and disposed of in accordance with C&D Waste Management Rules, 2016. Experts are of the opinion that the C&D waste can be used for filling of low-lying areas provided it is done in an environmentally safe manner and with the permission and consent of the owner of the land. • Local authorities shall ensure collection and transportation of C&D waste generated from its own activities and activities of other government departments working in the municipal area to the nearest C&D waste treatment facility.

4. Impose user-fees and penalties

4.1 Generator to pay user fee:

4.1.1 As per the SWM Rules, 2016, every generator needs to pay user fee as decided by the bye-laws of the local authority.

4.1.2 Bye-laws shall ensure that generator pays user-fee. Bye-laws shall also contain a provision that the increase in user fee shall be at a fixed percentage every year so that there is no need to revise the same by legislative intervention. This would ensure that user fee does not become irrelevant after few years.

4.1.3 The user fee shall be collected on monthly basis.

4.1.4 Local Authorities shall set up an efficient and transparent mechanism for collection of user fee and also create systems to pay user-fee online to ensure transparency.

4.1.5 Local Authorities shall keep records of user-fee collection to ensure accountability and transparency.

4.1.6 Local Authorities shall make every effort to increase the awareness of people about the solid waste management and the user fees. Proper announcement through advertisement in media, hoardings, public announcements, distribution of leaflets etc. shall be undertaken.

4.2 Households to be penalized for non-segregation: Local Authorities shall penalize households for non-segregation with effect from 8th April, 2018.

4.3 Societies/flats/RWAs etc. to be penalized for not creating systems to manage segregated waste: Local Authorities shall penalize gated societies/flats/RWAs etc. in case they do not create systems to manage segregated waste at source with immediate effect. In extreme cases, local authorities may recommend for electricity disconnection.

4.4 Heavy fines for littering and non-compliance:

4.4.1 Revision of littering fine under the existing DMC Act, 1957 is the need of hour. At present, fine of Rs. 50/- is imposed for littering. This needs to be revised to Rs. 500-1000/- per case.

4.4.2 Local authorities shall issue spot challans for any case of individual littering within the municipal area. They shall give powers to the Sanitary Inspector/ Asstt. Sanitary Inspector/any other authorized official/person to issue spot challans.

4.4.3 Similarly, bulk generators and others shall be liable to pay heavy fines for creating littering nuisance in the city.

4.4.4 In every designated commercial area, it shall be the responsibility of the market associations/group of shop-owners to ensure that there is no littering and throwing of garbage on the roads, drains and public spaces. In case of occurrence of any such event, local authority shall impose heavy fines. In extreme cases, the electricity connection may be recommended to be disconnected or license of shop may be suspended after issuance of 5 challans by the local authority.

4.5 Local Authorities shall install CCTV cameras to capture defaulters at prominent black spots/illegal dumping points in the city.

4.6 Open burning: As per NGT's order dated 22nd December, 2016 (annexed herewith), there is a complete prohibition on open burning of waste on lands, including at landfill sites. For each such incident or default, violators including the project proponent, concessionaire, ULB, any person or body responsible for such burning, shall be liable to pay environmental compensation of Rs. 5000/- in case of simple burning, while Rs. 25,000/- in case of bulk waste burning. Environmental compensation shall be recovered as arrears of land revenue by the competent authority in accordance with law.

4.7 Devise a system/App: Local Authorities shall develop an application or a system to address complaints and to spot-check the black spots removal in the city. They shall create a system wherein any person can post a picture and the municipality shall clear the posted black spot in 48 hours time. If task is not done, then the same shall be notified to the higher officer. This shall also help in rating the efficiency of the municipality in solving grievances.

Annexure 1: Existing status of waste management in Delhi

1. Overview

Five municipal authorities are responsible for solid waste management in the city—the North Delhi Municipal Corporation (North DMC), South Delhi Municipal Corporation (SDMC), East Delhi Municipal Corporation (EDMC) the New Delhi Municipal Council and the Delhi Cantonment Board (DCB). The three corporations—North, East and South—alone manage 96 per cent of the total area of the city. As per information provided by MCDs, 10050 TPD of municipal solid waste is collected in Delhi.

Table 1: Municipal Solid Waste Profile of Delhi

		South Delhi Municipal Corporation (SDMC)	North Delhi Municipal Corporation	East Delhi Municipal Corporation (EDMC)	New Delhi Municipal Council (NDMC)	Delhi Cantonment Board (DCB)	Total
Area (In Sq Km)		656.91	638.35	105.98	42.4	42.8	1486.44
Approx. Population (In Lakhs)		64.15	66	45.2	2.75	1.4	179.5
Zone (In number)		4	6	2	-	-	-
Municipal Ward (In number)		104	104	64	-	8	280
Approved Colonies (In number)		388	728	90	-	-	1206
Unauthorized/Regularised Colonies (In number)		252	98	253	-	-	603
Resettlement Colonies (In number)		32	25	19	-	-	76
Urbanized Villages (In number)		81	33	23	-	6	143
Rural Villages (In number)		86	85	43	-	-	214
Unauthorized Colonies (In number)		932	449	253	-	-	1634
Waste generation (TPD)		3400	4350	-	-	-	-
Waste collected (TPD)	MSW	3400	3950	2200	300	200	10050
	C&D waste	1000	2500	700	50	192	4442
	Drain silt	200	200	200	50	25	675
	Residue/ Ash	600	370	400	-	-	1370
Per capita waste generation (g/capita/day)		554	580	525	556	462	-
Swactha Karamcharis (SKs) (In number)		22,756	25,272	15,000	2,400	1093	66521
Disposed on dumping sites/ Landfills (TPD)		1700	1650	1200	-	60.53	4611

Composted (TPD)	200	1000	-	-	-	1200
Incineration (TPD)	1600	2000	1000	300		4900
Total waste processed (TPD)	-	-	-	-	-	6100

Source: Data from SWM Presentation, All MCDs, 13.7.2017

1. Composition of the waste – deciding factor for technology to be adopted

All studies on waste composition show that 50–60 per cent of Indian municipal solid waste consists of compostable matte. In a recent survey conducted in May 2017 on the basis of samples taken in SDMC area by Shriram Institute for Industrial Research Delhi, it was observed that the biodegradable part of waste was between 55-60%. According to the same report, the mixed waste had calorific value in the range of 1274.25 -1324 kcal/kg.

It also highlights how the waste composition for the city is not appropriate for incineration based technologies. As per the Solid Waste Management Rules, 2016, minimum waste calorific value for incineration is 1500 kcal/kg. Also, according to Waste to Energy Guidelines, 2017, a calorific value of over 1600 kcal/kg is required to run Waste to Energy plants without use of any auxiliary fuel.

According to Planning Commission report, 2014 and NGT order OA 199 of 2014, dated 20 March 2015, only the non- recyclable high calorific value waste should be used for WtE projects. In this scenario, considering Delhi's data made available by the MCDs, on an average about 10% of the waste is expected to continue to be recovered for recycling by the informal sector, 65% could be treated using either biological or thermal treatment technologies and the remaining 25% is inert material that cannot be treated using either biological or thermal treatment technologies. Of the 65% treatable material, 60-70 percent can be processed through composting or bio-methanation technologies, while 18-20 percent (textile, cloth, rubber, LPV) can be thermally treated through incineration based technologies. Presently, everything that is recyclable is also being incinerated; from the committee meetings, it appears that presently MCDs are encouraging mixed waste to be processed in the WtE plants.

A recent study on Waste to Energy Options in Municipal Solid Waste Management, 2017 states that prior separation of recyclables influences the characteristics of the remaining waste[1] as presented in Table 2 below.

Table 2: Impacts of removal of fractions from WtE plant that can be processed, recycled

Fraction removed	Prime impacts of removal on remaining waste
Glass, metals, ash, minerals from construction and demolition waste	Increased calorific value Decreased quantity of slag and recoverable metals
Paper, cardboard and plastic	Calorific value decreases Chlorine loads (e.g. from PVC) in emissions decrease
Organic waste from kitchen and garden	Decreased moisture loads Increased calorific value
Hazardous waste (e.g. batteries, electronics)	Reduced effort to remove toxic volatile heavy metals from air emissions (e.g. mercury) Reduced concentration of toxic pollutants in slag and fly ash (e.g. cadmium, lead, zinc)

Source: Report, 'Waste-to-Energy Options in Municipal Solid Waste Management', 2017, https://www.giz.de/en/downloads/GIZ_WasteToEnergy_Guidelines_2017.pdf

1. Report, 'Waste-to-Energy Options in Municipal Solid Waste Management', 2017,

2. Current staff involved in waste management with the civic bodies in Delhi

The MCD's municipal solid waste operations employ more than 60,000 workers. These Swactha Karamcharis (SKs) are involved in street cleaning, waste collection and transportation(C&T), storm drains cleaning less than 4 ft., cleaning of urinals and waste processing/disposal. The yardstick for deployment of SKs is as under: -

Table 3: Deployment of SKs in Municipal Area

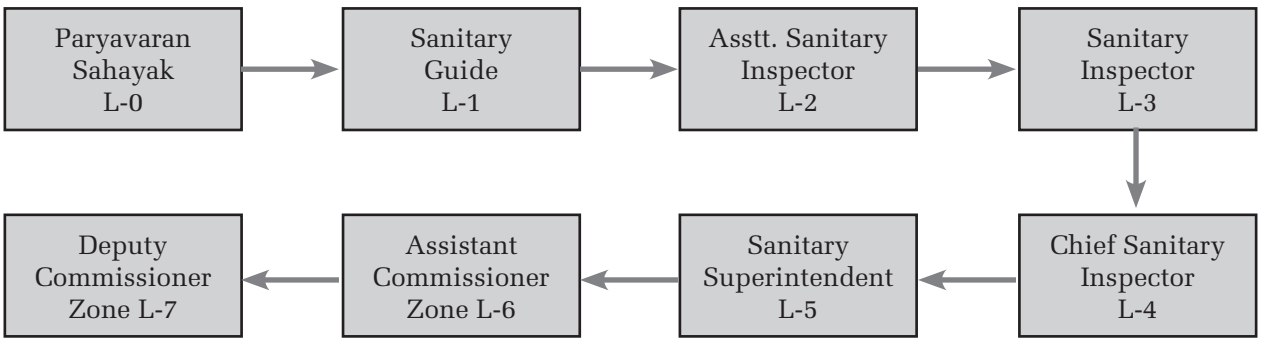
S.No.	Type of area	Area to be swept every day by a Safai karamchari
1	Congested area in walled city	3,000 Sq. m
2	Roads upto 20 m width in Colonies	6,000 Sq. m
3	Rural areas	7,500 Sq. m
4	Roads upto 20 m Right of Way (ROW)	12,500 Sq. m

Source: Information provided by MCDs in committee meeting dated 20th July, 2017

Inspection and monitoring of the staff

The reporting and controlling zonal hierarchy is explained below for MCD. However, there is a lacunae in accountability and enforcement.

Figure 1: Reporting and controlling zonal hierarchy for Sanitation staff



Source: Information provided by MCDs, July, 2017

In SDMC area, in order to have effective monitoring of the sanitation of all wards, 53 senior officers of SDMC have been assigned two wards each for conducting inspections with regard to sweeping, cleanliness of toilets/urinals and sanitation related activities. Corrective measures are taken by the respective field officers for attending to the deficiencies pointed out by the inspecting officers. Also, WhatsApp groups have been created between different RWAs and market associations in SDMC area and SDMC officials to monitor the progress and address grievances. In NDMC[2], tenders are being floated by IT Department for latest bio-metric system for recording attendance to curb absenteeism of SKs and other staff. However, biometrics have already been installed in SDMC.

Salary of the workers

A regular Safai Karamchari gets salary as per 7th Central Pay Commission along with allowances as per information provided by SDMC:

2. Status Report and Action Plan for Improvement in Municipal Solid Waste Management, all MCDs, 2017

B.	**Regular Safai Karamcharis**
➢	Minimum Wages as per Delhi Schedule gets Rs 13350/- per month (Rs 513.00 per day)
➢	Re-imbursement of medical expenses or Medical allowance at Rs 225.00 per month.
➢	Washing allowance at Rs 90.00 per month.
➢	Cycle allowance at Rs 90.00 per month.
➢	Dirt allowance at Rs 300.00 per month.
➢	Uniform (both Summer & Winter).
➢	Necessary safety equipments.
➢	In case of death during service, his spouse or son/daughter engaged as Daily Wager SafaiKaramchari on Compassionate Ground.
➢	In case of deceased employee, financial assistance of Rs 50,000/- for marriage of his/her daughter under NIGAMANSH
➢	Financial assistance ranging from Rs 5,000/- to Rs, 10,000/- for education of their son/daughter under NIGAMANSH.
➢	Funeral Allowance of Rs. 10,000/- in case of death during service.
B.	**Daily Wage Safai Karamchari**
➢	Minimum Wages as per Delhi Schedule @ Rs 13350/- per month (Rs 513.00 per day)
➢	Cycle allowance @ Rs 90.00 per month
➢	Dirt allowance @ Rs 300.00 per month.
➢	Uniform (both Summer & Winter).
➢	Necessary safety equipments
➢	In case of death during service, his spouse or son/daughter engaged as Daily Wager Safai Karamchari on Compassionate Ground

Source: As per information provided by SDMC, July, 2017

3. Status of segregation at source

The status of segregation in the city is not more than 2 percent and is restricted to a few institutions and colonies only- Defence Colony, Delhi University. However, recently, SDMC, DCB and North Delhi have initiated distribution of bins to push for segregation at house-hold level. The major issue being that even in areas, where segregated waste is being collected, it is mixed again in dhalaos or the recent fixed compactor transfer station (FCTS) and transported to either the WTE plants or dumpsites. As provided by the MCDs, listed some of the initiatives taken for segregation in the city:

Table 4: Initiatives undertaken for segregation

Body	Initiatives taken
North Delhi Municipal Corporation (NDMC)	• Door to door collection of MSW in Rohini and Civil Line Zone is being done and waste is processed at engineered landfill site at Narela-Bawana. • Distributed about 4000 twin bins to householders in one colony each in six zones to promote segregation • In five zones, private parties have been given the responsibility to comply with segregation program and to create awareness. • Awareness is being done by distributing pamphlets, meetings with RWAs, market associations, public representatives, nukkadnataks, children education program, etc. • Procurement of 6000 nos. of road side twin bins to prevent littering.

South Delhi Municipal Corporation	• SDMC in partnership with M/s ITC Ltd. has undertaken a project in the areas of R.K. Puram, Munirka, Nanak Pura for source segregation involving/ motivating the residents to undertake segregation of waste. This project has been undertaken as part of the CSR activities by ITC with the help of an NGO, which imparts necessary training to the Safai Karamcharis the supervisory staff such as the Assistant Sanitary Inspectors, the Sanitary Inspectors, the rag pickers etc. • For awareness of the public, a public notice was issued in the leading newspapers. • Pamphlets in this regard are being distributed apart from other publicity measures such as through radio jingles etc. Other activities such as nukkad natak's etc., education in schools, interaction with RWAs etc. highlighting the importance of segregation and adherence to solid Waste Management Rules, are being done. • Separate dustbins for collection of waste at roadsides have been provided at places such as markets, bus stands, metro stations etc. • In the past two years- 9,000 pairs of dustbins (for wet and dry waste) have been provided by the SDMC.
East Delhi Municipal Corporation (EDMC)	Pilot project of segregation at Preet Vihar recently started and local composting of biodegradable waste has been resorted to.
New Delhi Municipal Council (NDMC)	Private parties have given the responsibility to collect segregated waste
Delhi Cantonment Board	• 8600 twin dustbins have been distributed in cantonment area for promotion of segregation • For awareness of public, hoardings and posters have been put up.

Source: Data from SWM Presentation by all MCDs 13.7.2017

4. Waste collection in Delhi

As per information provided by MCDs, there are two waste collection systems running in Delhi. Under one system, collection is done through formal sector by the municipal staff or by an authorized party or private concessionaire. Under the other, the informal sector is responsible for door-to-door collection of garbage, which is further transported to dhalaos after the waste picker takes up the recyclable fraction. The informal sector is integrated into the collection systems by an informal contractor. As documented in CSE's report, 'Not in My Backyard', 2016, there are about 300,000-400,000 ragpickers in Delhi, who play a critical role in the recycling industry and help prevent tonnes of recyclable waste from reaching the dumpsites. There is an urgent need to integrate (upscale) the two collection systems and incentivise the collector to collect segregated waste.

MSW is collected daily from storage /receptacles /collection centers/ (dhalaos/dustbins/) existing at different places in all statutory bodies of Delhi. This MSW does not include segregated waste picked up by waste pickers / kabariwala at the doorstep and Collection Centers. This waste generated by the citizens is deposited in the receptacles either by the citizens themselves or through private waste pickers and the same is taken to various facilities for processing/disposal. NDMC is carrying out door-to-door collection and segregation of MSW in its jurisdiction.

As per the 2021 Master Plan, community bins or dhalaos need to be provided in 100 sq m of space for every 10,000 people; in addition to this, another 200 sq m of space must be provided for

segregation of non-biodegradable wastes. But the DDA does not provide adequate space for storage of waste in both existing and new colonies that are being planned. In SDMC area, all the dhalaos are being converted to fixed compactor transfer stations (FCTS) due to the menace and nuisance that dhalaos have created in the past. Also, in all the other MCD's, the plan is to phase out dhalaos. It has been proposed to either convert them to Material Recovery Facilities or FCTSs.

Contract with private concessionaire

The contracts with the private parties come at a huge cost to the MCDs. As per information provided by CSE, a contract between the North DMC with Ramky costs 1,450 INR/tonne: this covers C&T, maintenance of dhalaos, establishing processing plants, landfilling and conducting awareness programmes. This translates to 43.5 lakh INR per day. Similarly, as per information furnished by EDMC, the civic body has a contract for primary and secondary transportation with private players that is 1100 INR/tonne and does not involves processing.

As per Centre for Science and Environment (CSE) expert, there are several issues with the contracts signed between MCD and concessionaire. Some of them are highlighted below:

- The major issue is that the tipping fee is paid for C&T, not for per tonne of waste processed. Thus, processing and disposal is lowest in priority. Moreover, collection and transportation is still being done largely by open dumpers, when as per law they should be properly covered trucks.

- Usually, no contract lasts the entire concession period due to poor financial agreements and legal liabilities towards one or the other party.

- A look into the DPRs and contract agreements signed by the concessionaire (private party) and the municipality clearly highlights that segregation of waste is limited to documents only. It is not happening on the ground.

- The concessionaire is responsible for door-to-door collection, but takes mixed waste from houses as it increases the tipping fee/tonne of waste.

- Another issue is that segregation of waste reduces the tipping fee given by the municipality to the concessionaire. The amount of the fee also varies widely from municipality to municipality.

Installation of fixed compactor transfer station (FCTS)

Recently, SDMC has introduced FCTS in order to remove the dhalao system, which was becoming a huge problem to manage. This system includes primary collection of waste from the street level through auto tippers, transporting the waste in covered primary vehicles to the fixed compactor transfer station (FCTS)/mobile transfer stations, transporting the compressed garbage from the secondary storage through mobile compactors/FCTS to the waste to the energy plant and collection & transportation street sweeping waste, drain silt and dumping of same to the SLF site. However, installation of such systems is also pushing for unsegregation and feeding mixed waste to WtE plants. However, *FCTS should be used for compaction of only non-recyclable/non-compostable inert waste.*

Table 5: Waste collection and transportation systems in Delhi

Body	Primary Collection	Secondary Collection	Infrastructure/ Equipment Available
North Delhi Municipal Corporation (NDMC)	• Six zones including Civil Lines and Rohini, 376 auto tippers are engaged for door-to-door collection of waste.	• Door to door Collection and transportation from Dustbins and Dhalaos (Collection Points) to SLF Narela-Bawana Engineered landfill site through a private organization and segregation is done by them • City Zone, S.P. Zone, Karol Bagh Zone of North DMC have also been outsourced to private players. • The daily uploading of photographs of 700 collection points after cleaning is send by the field staff. • Beat wise information of SKs is reported to HQ. • The Photographs of public conveniences after cleaning is sent to HQ.	Dhalao/ Dustbin/ open site 700 Wheel Barrows 4054 Tricycle/ Rickshaw 1800 Hand carts 176 Auto tippers 376
	Segregation done by concessionaires at secondary collection points, i.e. Dhalaos, agencies involved include Delhi Waste Management, A.G Enviro Infra Projects		
South Delhi Municipal Corporation	• Najafgarh Zone have street to street collection by auto tippers. • At present door to door • collection of MSW is being done by the informal sector i.e. waste pickers. However, SDMC provides resources such as auto tippers, E-rickshaws, cycle-rickshaws, and Wheel Barrows for Street level collection • After the primary collection of solid waste, the same is transferred to i) Fixed Compactor Transfer Stations (FCTS) ii) Mobile Compactors.	• The secondary transport of MSW through the FCTSs/Mobile Compactors involves disposing the solid waste. They compress the waste and reduce their volume. • The work of solid waste is being carried out by private sector in three out of the four zones of SDMC namely Central Zone, South Zone and West Zone. • The fourth zone namely the Najafgarh Zone is managed through deployment of departmental trucks, loaders, excavators as well as the departmental labour.	Dhalao/ Dustbin 756 Wheel Barrows 2900 Tricycle/ Rickshaw 982 Auto tippers 274
	The primary and secondary collection of MSW has been awarded to concessionaires for three zones in SDMC the average cost of collection and transportation is approximately Rs.1800/MT. Namely three agencies are M/s ILFS, AtoZ, SSIL for central zone, west zone and south zone respectively. And tender for Najafgarh zone on PPP Mode has been called. SDMC outsourced the work of Collection and Transportation of Municipal Solid Waste, Street Sweeping Waste, Green Waste and Construction and Demolition (C&D) Waste in Central Zone to the concessionaire vide agreement dated 19.11.2015 for a period of seven years. Following tipping fee be paid to the concessionaire:- i. MSW and street Sweeping Waste: @Rs. 1727/- per Metric Ton (MT) ii. Drain Silt: @Rs. 1430/- per Metric Ton (MT) iii. Green Waste: @Rs. 2452/- per Metric Ton (MT) iv. C&D Waste: @Rs. 158/- per Metric Ton (MT)		

East Delhi Municipal Corporation (EDMC)	• Shahdra (North &South) have street to street collection by auto tippers. • Auto tippers/cycle	• The garbage collected at dhalao/ open sites are transported from dhalao to the SLF, Gazipur by 100 trucks and 30 loaders in three shifts beat wise daily	Dhalao/ Dustbin 300 Wheel Barrows 1634 Tricycle/ Rickshaw 960 Auto tippers 302
	Primary and Secondary transportation cost 1100 INR/MT		
New Delhi Municipal Council (NDMC)	• New Delhi Municipal Corporation is carrying out door to door collection in its jurisdiction	• Private player takes care of the waste post collection	Auto tippers 28
Delhi cantonment Board	• 100% door to door collection by a private contractor is being done[1]	• Private player takes care of the waste post collection	Dhalao/ Dustbin 509 Auto tippers 16

Source: CSE, 2017 through data from SWM Presentation in all MCD 13.7.2017 and DPCC report, 2016

GPS tracking for the waste management vehicles[3]

EDMC and SDMC have started GPS /Radio-frequency identification (RFID) based tracking system to locate the position of its refuse removal trucks and other vehicles to increase their efficiency and productivity. This also ensures regular and timely collection of garbage and deportation to the Ghazipur SLF. 232 GPS have been installed on auto tippers and around 450 RFIDs are fixed on waste storage depot, tipper trucks, and workshop and landfill sites. In EDMC area, the vehicles deployed in Rohini Zone and Civil Line Zone (about 248 no. of vehicles) are equipped with GPS. In SDMC, this work has been outsourced to DIMTS (Delhi Integrated Multi-Modals Transit System).

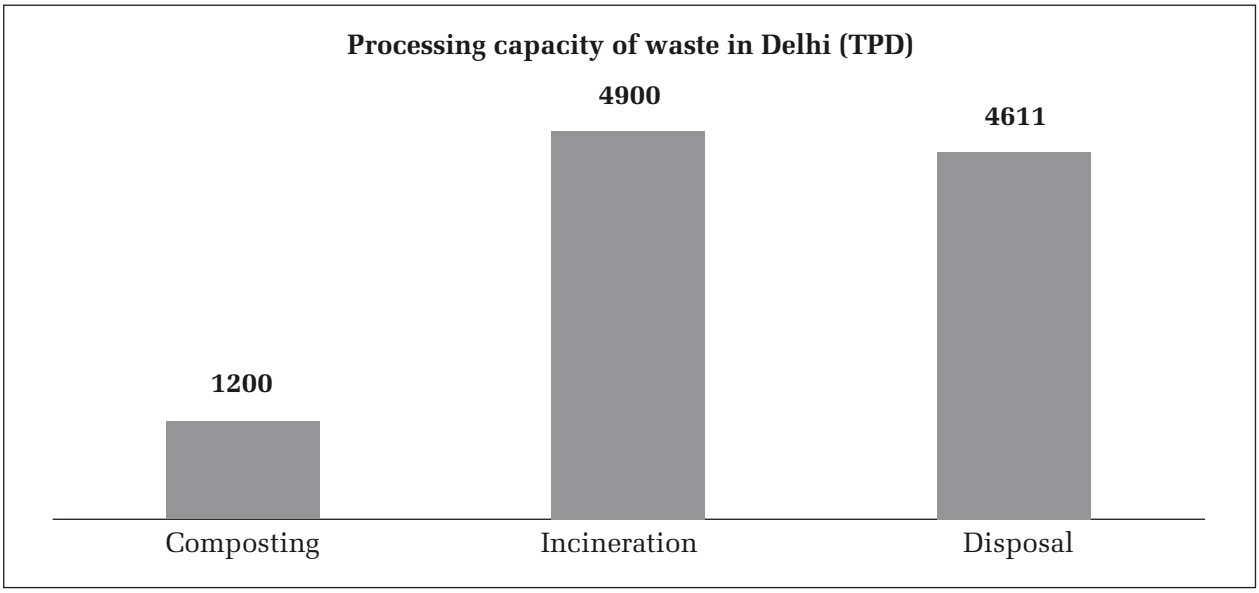
Street Sweeping: MCDs carry out street/road sweeping by deploying departmental safai karamcharies. Each SK is supplied with a broom and a showel for sweeping and collecting the swept material at one place. The sweeping waste collected is deposited in community bins located at various points. This waste is deposited in community bins through wheelbarrows, rickshaws and auto tippers. Road sweeping is also carried out by mechanical road sweepers on some roads of New Delhi Municipal Council, Dwarka and various areas of SDMC. SDMC proposes to deploy 12 mechanical sweepers on the roads under its jurisdiction.

3. Final Solid Waste Management Of EDMC, 2017

5. Processing and disposal

As per data made available by MCDs, Delhi has a processing capacity to treat close to 6000 tonnes of MSW.

Figure 2: Processing capacity of waste in Delhi



Source: As per information provided by MCDs in committee meetings, July, 2017

- Composting: Two centralised composting plants—at Okhla and Bawana—together process about 1200 TPD of biodegradable waste; however, the quality of compost obtained from these plants is highly compromised upon. Over 20-30 tonnes of city compost is lying in Bawana because it has no takers. The reason behind this poor efficiency of the plants is that they receive unsegregated waste.

- **Waste to Energy:**

    - Delhi has three WTE plants – Ohkla (2000 tonnes, 16MW) operated by Jindal Ecopolis, Gazipur (1300 tonnes, 14MW) operated by IL&FS and Narela- Bawana (2000 tonnes, 24MW) operated by Ramky Enviro.

    - Mixed recyclable and organic waste is being fed into these plants in order to meet the required high calorific value of 1400 kcal/kg. This is in contradiction with directions of NGT in its order dated 22 December, 2016 as well as SWM Rules, that have mentioned that no recyclables and mixed waste to be used in these plants.

    - The Okhla plant has been in the news since its inception as its neighbours have taken the management of the plant to court, alleging pollution. After many legal battles, the case was finally heard at the National Green Tribunal, which, in its February 2017 order has directed Jindal Ecopolis to "adopt better technology for segregation of waste before it is put in the furnaces" and also fined the proponent an environmental compensation of 25 lakhs. However, there is still no resolution as the residents remain unconvinced by these measures and have taken the case to the Supreme Court.

    - **Disposal:** All the three existing dumpsites of Delhi exceeded their capacities way back in 2008. The dumping sites in Delhi do not have any methanisation or gasifiers to control

the methane being produced naturally by the bio-degradable garbage. There are no fire protection systems at these sites, thus making them a potentially flammable location. There is no landfill gas-collection system either. Moreover, one of the sites—at Bhalswa—is also located adjacent to a major city level drain and several other water bodies that can carry heavy metals, leachate and other potential pollutants across the city and end up in river Yamuna. As per experts, most of these sites have contaminated the aquifers and groundwater in and around their neighbourhoods.

Table 6: Existing infrastructure for waste disposal/proposal

Composting Sites	• Okhla (200 tonnes) • Bawana(1000 tonnes)
Waste to Energy	• Okhla (2000 tonnes, 16MW) • Gazipur (1300 tonnes, 14MW) • Narela- Bawana (2000 tonnes, 24MW)
C&D Facility	• Shastri Park (500 tonne) • Burari (2000 tonne)
Landfills/Dumpsites for waste disposal	• Ghazipur (70Acres, oversaturated) • Okhla (56Acres, oversaturated) • Bhlasawa (40Acres, oversaturated) • Bawana (Integrated waste management plant in 100 acres)

Source: As per information provided by MCDs in committee meeting held on 17th & 20th July, 2017

One LFG pilot project at Ghazipur had been established in 2013 by GAIL for extraction of landfill gas to reduce greenhouse gases. The project at Gazipur is functional only a few days in a month due to unavailability of the gas.

Table 7: Current processing and disposal infrastructure in place

Sl. No.	Name of facilities	Name of Urban local bodies					
		South DMC	North DMC	East DMC	NDMC	DCB & others	Total waste
1	Okhla Waste to Energy Plant	1600	300	-	300	50	2250
2	Compost Plant Okhla	200	-	-	-	-	100
3	SLF Okhla (dump site)	800	-	-	-	-	800
4	SLF Bhalswa (dump site)	900	1650	-	-	150	2700
5	Integrated waste facilities at Narela Bawana	-	2000	-	-	-	2000
6	Ghazipur Waste to Energy Plant	-	-	1000	-	-	1000
7	SLF Ghazipur (dump site)	-	-	1200	-	-	1200
	Total	**3400**	**3950**	**2200**	**300**	**200**	**10050**

Source: SWM Presentation in all MCD 13.7.2017, SLF- Sanitary Landfill

Table 8: Ash/Silt dumped in the landfills

S. No.	Name of facilities	Name of Urban local bodies					
		South DMC (in MT)	North DMC (in MT)	East DMC (in MT)	NDMC (in MT)	DCB (in MT)	Total waste (in MT)
1	SLF Okhla Site (dump site)	750	-	-	-	-	750

2	SLF Bhalswa (dump site)	50	200	-	-	100	350
3	SLF Ghazipur (dump site)	-	-	600	50	100	750
4	Integrated waste facilities at Narela Bawana	-	370	-	-	-	370

Source: SWM Presentation in all MCD 13.7.2017

Table 9: Proposed plans by MCDs to upscale processing capacities

Body	Processing technology
South DMC	Waste to Energy: • Planned for setting up of a waste to energy plant for processing 2000 MT per day of solid waste is proposed to be set-up at the land recently allotted by DDA. This land measuring approximately 29 acres is situated close to the existing landfill site at Okhla. The proposed plant, would be a PPP mode project. • SDMC claims that with the setting up of the plant be entire quantity of solid waste generated in SDMC would be fully processed. The tender for the subject work have been invited vide NIT No. SDMC (DEMS) CD/2017-18/21 dated 27.4.2017. The detailed project report for the instant project has been approved by the State High Power Committee and subsequently by MOUD. • The proposed project's approval is pending with Delhi Electricity Regulatory Commission (DERC). Clearance for the land allotted for this purpose is also awaited from Ridge Management Board and subsequently by Empowered Committee, MOEF.
	Composting and Biomethanisation • One composting pit in each Municipal ward of SDMC has been proposed. • The bulk generators of waste such as hotels, restaurants, shopping malls, institutions are being encouraged to take up composting within their own premises. • Mandi's and Gowshalas to have biomethanisation plants • There is proposal for setting up of four biomethanisation Plant of 100MT capacity at Goyla Dairy, Aacharya Sushil Muni Gaushala, Nangli Dairy Colony and Kakrolla in near future. • SDMC has totally stopped disposing green waste to any SLF site and completely re-using the green waste by mulching, composting in 85 small scale centres or in parks.
	Status of land allotment by DDA to SDMC • Allotment of 28.91 acres of land made by DDA on 7/3/17 for setting up of WtE Plant. • Allotment of 14.20 acres of land (presently in possession of CCI) has been made on 'as is where is basis' on 11/4/2017 by DDA to SDMC. • Request for allotment of 2.475 acres abutting the already allotted 35.33 acres of land at Tehkhand has been made to VC/DDA on 8/6/17 for ingress. (Under process in DDA) • Request for allotment of 12.626 acres of land abutting 35.33 acres of land for establishing reject management facility for proposed Waste to Energy Plant on 8/6/17. (Under process in DDA) • Request for allotment of 50 acres of land near Maidan GArhi for establishment of waste processing facility (C&D Plant) has been made to DDA on 10/7/17.
East DMC	• 50 percent of EDMCs garbage is being processed at WtE Plant Ghazipur, there are further talks of expansion of WtE Gazipur plant. • Has also initiated proposals for decentralized biodegradable waste processing. • Land for integrated waste management complex has been sought from DDA. The matter is under consideration with NGT
North DMC	• Expansion of existing WtE plant at Narela Bawana from 2000 TPD to 4000 TPD to generate 36 MW electricity • Installation of 15 MW WTE plant to be set up at Bhalswa landfill

4. DPCC report on waste management in Delhi, 2016

List of committee members

1. The Secretary, Ministry of Environment, Forest and Climate Change, Government of India, New Delhi

2. The Secretary, Ministry of Urban Development, Government of India, New Delhi

3. The Secretary, Department of Health, Government of NCT of Delhi

4. The Commissioner, North Municipal Corporation of Delhi, Dr. S.P.M. Civic Centre, Minto Road, New Delhi - 110002

5. The Commissioner, East Municipal Corporation of Delhi, 419, Udyog Sadan, Patparganj Industrial Area, New Delhi- 110092

6. The Commissioner, South Municipal Corporation of Delhi, Dr. S.P.M. Civic Centre, Minto Road, New Delhi - 110002

7. The Secretary, New Delhi Municipal Council, Palika Kendra, Sansad Marg, New Delhi-110001

8. The Secretary, Delhi Jal Board, Varunalaya Phase-II, Jhandewalan, Karol Bagh, New Delhi-110005

9. The President, Dehi Cantonment Board, Sadar Bazar, Delhi Cantt., New Delhi-110010

10. The Chief Managing Director (CMD), Delhi State Industrial & Infrastructure Development Corporation Ltd., N-36, Bombay Life Building, Connaught Circus, New Delhi-110001

11. The Chairperson, Delhi Pollution Control Committee, 4th Floor, ISBT Building, Kashmiri Gate, Delhi-110006

12. Mr. M.C. Mehta, Advocate (Environmentalist)

13. Ms. Sunita Narain, Director General, Centre for Science and Environment

14. Ms. Isher Judge Ahluwalia, Chairperson, Indian Council for Research on International Economic Relations, Planning Commission of India

15. Ms. Almitra Patel, Advocate

16. PS to Member Secretary, DSLSA

17. The Superintendent, Procurement Branch, DSLSA