MUNICIPAL SOLID WASTE MANAGEMENT IN DELHI-AN OVERVIEW

1. MSW Management and Suggested Action Plan for Delhi

1. Gaps and Constraints

During the course of recent studies and interaction with stakeholders, the following gaps and Constraints were observed:-

i. Lack of state policy or uniformity in policy guidelines amongst various states in the management of MSW.

ii. Local bodies have so far not prepared a time-bound action plan to undertake collection, segregation, storage, transportation, processing and disposal of MSW.

iii. There is no agency which can assist local bodies technically, either at State or national level to prepare the plans. Further, a detailed assessment does not exist as to how ULBs would meet targets as per MSW rules including financial requirements.

iv. There is currently no guaranteed performance report of any waste processing technology and under such circumstances ULBs are not in a position to take decisions about technology to be adopted.

v. Guidelines on optimization of technology corresponding to the quantum of wastes generation do not exist.

vi. Lack of professional staff in ULBs for handling specific responsibilities for Municipal Solid Waste management.

vii. Non availability of adequate and suitable land for developing sanitary landfill and processing facilities. The lands identified outside municipal jurisdiction face stiff resistance from local population (Not in my backyard (NIMBY) Syndrome)

viii. Studies outlining comprehensive plan for land filling by smaller local bodies (example: ULB generating waste <100 t/d) are not available.

ix. Local bodies, particularly where population is less than 5 lakh, are not in a position to finalize contracts on waste processing and disposal.

x. Lack of awareness amongst households on source segregation & storage of waste at source Preparation of Detailed Project Report (DPR) with estimated fund requirement have not been initiated / completed.

xi. Most of the State/ULBs have yet to understand the benefits of integrated waste management which facilitates efficient utilization of different components of waste management and select suitable developers or agencies for collection, transportation, processing & disposal of waste.,

xii. Awareness amongst the States/ULBs about the benefits of integration of various technologies for MSW processing are lacking. This is necessary as different technological options are required for treating the different components of waste, such as Composting/ Biomethanation process for Organic component, incineration/ gasification/ Refused derived fuel (RDF) process for combustibles portion of waste, inert management facility for Construction and Demolition (C&D) waste, etc

xiii. SPCBs and PCCs do not have adequate infrastructure including personnel to maintain regular interaction with ULBs,

2. 4th DFC Recommendations

1. The work regarding the disposal of urban waste should be taken away from the 'Engineering Department' and be assigned to a new 'Department of Urban Environment" reporting directly to the Commissioner of the municipality concerned. This department should aim to adjust the municipal policies and practices with the ever changing profile of urban waste and ensure no part of urban waste is allowed to be left unattended.

2. The department should provide and manage sites for depositing the domestic solid waste where the community can place its urban solid waste having surviving economic value for disposal;

3. The department should have an engineering wing under its administrative control for undertaking works involving breaking of bulky urban-waste into smaller units which are easy to be transported for ultimate disposal and management of the departmental equipment.

4. The department should be responsible for putting in place a mechanism where wet silt, the building and construction waste and urban waste other than the soft domestic waste is also removed from the site of the occurrence on a day-to-day basis.

5. The department should introduce schemes and programs to control spread 'suspended particle materials in the air to improve the quality of air in the NCT of Delhi;

6. The size and magnitude of the problem associated with disposal of city surface cleaning strongly warrants a comprehensive review of manual surface cleaning procedures and introduction of mechanization on a large scale.

Concerns Raised and Target Set for MSWM in the Twelfth Plan

Some of the major issues concerning solid waste management highlighted in the Twelfth Plan document are:

1) Absence of segregation of waste at source,
2) Lack of funds for waste management with urban local bodies (ULBs),
3) Lack of technical expertise and appropriate institutional arrangement,
4) Unwillingness of ULBs to introduce proper collection, segregation, transportation and treatment/disposal systems, and
5) Indifference of citizens towards waste management due to lack of awareness.

The Twelfth Plan (2012- 17) also clearly sets bench marks to be achieved for six parameters during the Plan period. A practical and workable follow up and support to meet the above benchmarks is critical to achieve the desired results. The twelfth plan working group on urban capacity building has specifically recommended creation of cadres, training opportunities for all the staff and an arrangement whereby national institutes of strength relevant for municipal services are identified and the local bodies are authorized to be in touch with them directly for troubleshooting and problem solving. This arrangement need to be formalized and implemented.

Based on the extensive interactions and intense discussion with professionals, private companies, local Governments, the Planning Commission TF has critically examined the existing system of MSW management and explored Waste to Energy options as an integral part of integrated MSW management

3. Management of MSW

1. At Central level, a Technical Cell may be set up to provide assistance to the State Governments/UT administrations and Local bodies enabling them to initiate implementation of MSW Rules particularly relating to setting up of waste processing and disposal facilities. Indicative guidelines on selection of waste processing and disposal technological options, model agreements for Private sector participation in solid waste management, etc., need to be widely circulated to the local bodies. At State level, similar type of cell may be set-up to assist local bodies. States may evolve Plans and Policy to provide technical and financial assistance to the local bodies.

2. Central Ministries such as Ministry of Urban Development (MoUD), Ministry of Agriculture and Ministry of New and Renewable Energy (MNRE) may continue to provide assistance to the States in terms of technical assistance and in selection of appropriate technologies relating to waste processing and disposal including facilitating States in seeking private sector participation.

3. Specific issues requiring consideration while amending MSW rules may include;
   - Promotion of regional facilities (common facilities) for setting-up of waste processing and disposal facilities and emphasizing on 'total recycling' of waste including inert portion.
   - Aviation authorities may issue appropriate guidelines to States while finalizing sites for waste processing and disposal for safe operation of aircraft including those of defense.
   - The Local bodies should submit time-targeted Action Plan for implementation of the MSW Rules.
   - Indicating buffer zone around landfill and waste processing sites.
   - Uploading Annual Reports by SPCBs/PCCs on website.

4. Dissemination of information through Electronic media including mass awareness campaigns and seeking private sector participation in solid waste management should be continued activity. Pollution Control Boards/ State Urban Development Departments may place consolidated status on solid waste management (can also include other sanitation issues of state), Annual Reports of local bodies including initiatives taken on web site for public benefit.

5. Specific attention is required on;
   (a) Setting up of waste processing and disposal facilities in hilly states and particularly at Defence bases.
   (b) Providing prescription of packages for waste processing and disposal in Defence/Railway and other set-up like Cantonment Boards.
   (c) Special technical and financial support to Tourists and religious places for solid waste management and particularly to Hill states, Islands (Andaman & Lakshadweep).
   (d) Identification of sites in states for setting up of common waste processing and landfill facilities.
   (e) Selection of towns and solid waste management plans for towns located on river banks and prioritizing these located on river Ganga (could be covered under Ganga River Basin Authority).

6. The important action required by each local body is to prepare a Comprehensive MSW Management Plan right from house-to-house collection to final disposal giving description of activities and costs required and it should be published and brought to the knowledge of public, state political system through News Paper and web-site/ and through other electronic media.

7. It is felt that unless, the status of implementation is reviewed regularly (at least once in six months) at Central and state level (at highest Administrative level), it is difficult to see satisfactory results.

8. The SPCBs/PCCs required to take up following actions;

• _SPCBs/PCCs are required to ensure that every Municipality prepares detailed project report (DPR) for implementation of MSW Rules, 2000 highlighting house-to-house collection, segregation, storage, treatment and disposal of wastes.

• _SPCBs/PCCs may direct municipalities/ULBs to set time- targets for implementation of DPRs submitted and monitor the progress through State level/District level Committee.

• _SPCBs/PCCs to follow up with the municipalities and suggest setting up waste processing/disposal facilities either by the municipality or engaging private entrepreneurs.

• _SPCBs/PCCs to issue directions to municipal authorities for ensuring 100% coverage in wastes collection, segregation, transportation, treatment and disposal in accordance with rules.

• _SPCBs/PCCs to ensure timely submission of Annual Reports to CPCB by 15th September every year. The Annual Reports should contain complete information relating to MSW management (quantity of waste generation, collection, treatment, recycling, disposal/landfilling, etc.) including details of facilities.

• _SPCBs/PCCs should monitor regularly the compliances of standards as specified in the schedule IV of the MSW Rules in waste processing/disposal facilities including the existing dump sites.

• _SPCBs/PCCs should initiate awareness program among citizens to ensure proper implementation of MSW rules, especially for collection and segregation of wastes.

Management Options: - Municipality, PPP and private sector in feasible and viable combinations to execute successfully all stages of MSW management..

a) Integrate self employed waste collectors to give them benefit of increased price of segregated waste,
b) End to End contract to a professional Agency at Administrative Ward level to take over from primary collection points upto disposal of wet and dry waste within the Ward,
c) Interlocking of economic interests at each level through Viable economic models for the Waste Collectors, the Agency and the ULB

4. Technical and Financial decisions

4.1 Technical

Selection of appropriate technology is one of the key considerations for success of a waste management system for a particular town/city besides taking consideration of other aspects like resource recovery, environmental soundness, financial support, involvement of stakeholders/ public and institutional capability.

In the Indian context, the following technologies are identified for processing of MSW:-

a. Biomethanation for wet biodegradable wastes

b. Conventional microbial windrow/mechanized/ vermi composting for wet biodegradable wastes

c. Preparation of briquette/ pellets/ fluff as Refuse Derived Fuel (RDF) from dry high-calorific value combustible wastes

d. Incineration / Gasification / Pyrolysis for dry high-calorific value combustible wastes

e. Plastic wastes to fuel oil

A combination of aforesaid technologies has been identified based on the range of population and quantity and quality (percentage of biodegradable) of wastes generated. In addition, the cost of setting up of processing plants along with the expected quantities of value added products and by-products have also been considered and indicated in the Table.

Sr. No.	Population range	Waste Gen.TPD	Composition	Technological options	Minimum requirements	Va lue added products	Approximate cost (excluding land cost)
1	Above 2 Million	>1100 TPD	Biodegradables 35 to 50 %	IWP comprising - BM +CC+ RDF W to E plant for power, based on: gasification , pyrolysis, incineration and mass burning. RDF to cement industry Plastic to fuel oil	Segregate wet wastes at source for BM and / or CC, dry wastes to be recycled or converted into RDF as feed stock for its own power plant / cement industry or any other power plant. Inerts to be land filled RDF must be burnt under controlled condition not below 850^{0} C	75m^{3} of bio gas or 100 KW of electricity per 1 TPD of segregated wet wastes + 60 kg manure in case of BM , 200 kg per TPD vermi castings / CC per TPD 20 % RDF + 15 % compost. 1 MW power per 100 TPD of MSW.	Rs 5-7 cr per 100 TPD of MSW composting + RDF Rs 15/20 lakh capital cost per 1 TPD for gas / electricity through Bio-methenation Rs 10 cr per MW power plant. Rs 20 lakh per 50kg capacity / shift catalytic conversion technology plastic waste to liquid fuel. Rs 16 crore per 10 tonne of plastic (pyrolysis technology)
2	1 M to 2 Million	550 to 1100 TPD	Biodegradables 40 to 55 %	IWP comprising - BM +CC+ RDF W to E plant for power, where wastes exceeds 500 TPD based on: gasification , pyrolysis, incineration and mass burning. RDF to cement industry Plastic to fuel oil	Segregate wet wastes at source for BM and / or cc, dry wastes to be recycled or converted into RDF as a feed stock for large power plant and landfill the inerts RDF must be burnt under controlled condition not below 850^{0} C	Likely output from BM, as above. 20 % RDF + 15 % compost. 1 MW power per 100 TPD of MSW.	As above

4.2 Financial.

The planning for an advanced MSWM system should be based on accurate financial calculations, taking into consideration all relevant costs and most likely revenues to be realized.

The major types of costs considered for Full Cost Accounting (FCA) of MSWM are the following:

- Front-end costs: pre-operative investments and expenses necessary to implement MSW services.
- Capital costs: one-time, fixed costs for land, plant, machinery, etc.
- Operating costs: daily expenses of managing MSW, refurbishment costs, and operation and maintenance (O&M) costs
- Back-end costs: expenditure required to wrap up O&M of MSW facilities at the end of their lifetime.
- Contingent costs: costs that might or might not be incurred in the future (e.g., remediating costs for disasters).
- Environmental costs: They result from environment protection or mitigation during MSW transportation, treatment, and disposal activities.
- Social costs: incurred to mitigate adverse impacts on health and well-being of local community on account of improper MSWM

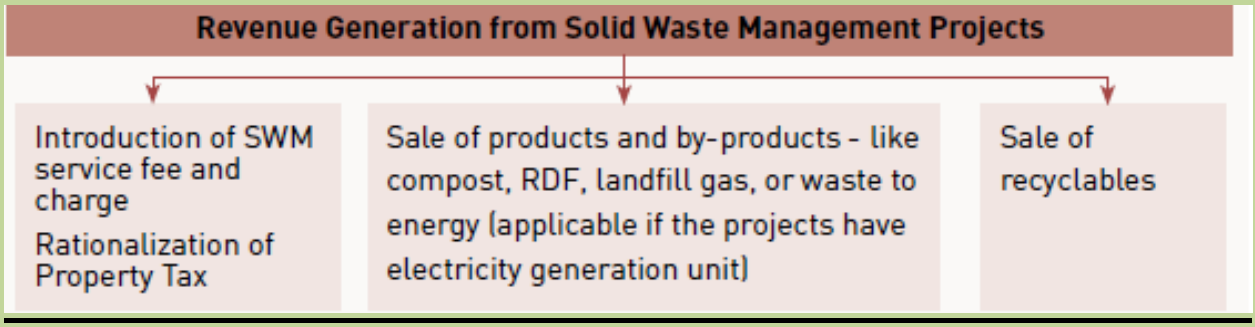
Sources of financing to be considered:

i Municipal resources that include taxes and duties: Traditionally, property tax in India has been the main source of revenue for ULBs to finance municipal services including MSWM. Rationalization of the property tax is required to ensure financial sustainability of these services.

ii Grants from central or state government: It has been widely recognized that ULBs are unable to meet the expenditure for their activities solely by internal resources. Hence, ULBs require substantial financial support from the central and state government in the form of grants and funds. Some of the grants and funds available to ULBs presently are:

- finance commission grants;
- central government grants (e.g., Swachh Bharat Mission); and
- State finance commission grants allocated by the state to local authorities once every 5 years to support administrative, governance, and municipal service delivery.

iii. Public private partnership as a source of funding.
iv. Loans from bilateral and multilateral agencies
v.
vi.
vii.
viii. Bank Loans.
xi. Other sources of revenues



5. Institutional and Infrastructure Management

Institutional Strengthening

To facilitate the municipal authorities improving solid waste management practices and the construction of waste processing and disposal facilities, an institutional support mechanism is recommended at national and state level which envisages having an Authority or Mission at the National level and a special technical cell under it ,designated as the reference point, to guide and support the states and municipal authorities in problem solving and facilitation including advise on appropriate technologies for processing and disposal of waste, allocate funds to improve MSW management, support the programmes of training and capacity building of municipal authorities, etc.

Incentives for MSW Management Infrastructure

i. Tax Exemption of Certain Bonds Issued by Local Authorities.(section10(15) of the I Tax Act)
ii. Tax Holiday for the Project Entity for Solid Waste Management
iii. Tax Exemption for Income of Infrastructure Capital Funds and Companies (. Section 10(23G) I T Act)
iv. Inclusion as Eligible Investments of Charitable Funds for Urban Infrastructure: Section 1(5) (ix) of the Income Tax Act.
v. Availability of Funds by Sale of Carbon Credits

6. E-Governance and Decision Support System (DSS)

Keeping in view the advancement in science and technology application of "smart municipal solid waste management" concepts may be introduced by the municipal
authorities to keep a complete track on the operation of MSW management.
i. The use of Information Communication Technology (ICT) in MSW management will reduce the manual effort and enhance the efficiency of collection, transportation, and identification of dumping site, manpower management, resource management and addressing citizen's complaints.
ii. Use of technology in synchronization of waste vehicle tracking and quality monitoring should help to ensure better performance of the system.
iii. A Pilot SM-WMS project be initiated and systems /equipment be standardized enabling cost reduction and easy replication

6.2 Decision Support System (DSS

Decision Supports System (DSS) is a computer-based information system designed in such a way that help local bodies/ Municipality/ Managers to select one of the many alternative solutions to a problem. It is possible to automate some of the decision making processes in a computer-based DSS which is sophisticated and analyzes large amount of data and technical details. It helps municipalities in DPR preparation, reduces costs, increase coverage and enhances quality. The nature of problem itself plays the main role in the process of decision making.
DSS is an interactive computer based information system with an organized collection of models, procedures, software, databases, telecommunication, and devices, which helps decision makers to solve unstructured or semi-structured execution problems.
The Decision Support System (DSS) utilizes decision rules, models, coupled with a comprehensive database and the decision maker's own insights, leading to specific, implementable decisions in solving problems that would not be amenable to management science models. Thus, a DSS supports complex decision making and increases its effectiveness

Budget and Expenditure for MSWM & Sanitation

Years	NDMC		EDMC		SDMC		North MCD		Cantonment	
	Expenditure in Rs Lakhs									
	Total	Sanitation	Total	Sanitation	Total	Sanitation	Total	Sanitation	Total	Sanitation
2012-13			1041.38							
2013-14			20473.38							
2014-15			3633.28							
2015-16										
2016-17										

Introduction

1.1 Background

Urban India is facing an ever increasing challenge of providing for the incremental infrastructural needs of a growing urban population. According to the 2011 census, the population of India was 1.21 billion, of this 31% live in cities. It is projected that by 2050, half of India's population will live in cities. With this increasing population, municipal solid waste management (MSWM) in the country has emerged as a challenge not only because of the environmental and aesthetic concerns, but also because of the huge quantities of municipal solid waste (MSW) generated every day. According to Central Pollution Control Board (CPCB), 1,43,449 tonnes per day (TPD) of MSW was generated in India during 2014–2015, with an average waste of 0.11 kilogram(kg)/capita/day. Of the total MSW, approximately 1,17,644 TPD (80%) was collected, while only 32,871 TPD (22%) was processed or treated. Segregation at source, collection, transportation, treatment, and scientific disposal of waste was largely insufficient leading to degradation of the environment and poor quality of life.

Under the 12th and 13th Finance Commission, Grants for improvement of MSWM under programmes like Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT) in 2005. In 2008, National Urban Sanitation Policy was launched that covered urban sanitation including solid waste management as an important component was allocated.

However, despite encouraging pilots and achievements, most ULBs continue to face challenges not only in the areas of appropriate and advanced collection and transportation systems, technology selection, and disposal methods, but
also in sustainable financial management of MSWM. The non-compliance issue is still true after 16 years of the notification of the MSW (M&H) Rules, 2000 and the MSW rules 2016, notified in April, 2016.

In order to give a push to the municipal solid waste management in cities, the Ministry of Urban Development launched the Swachh Bharat Mission (SBM) in 2014.

SBM seeks to promote cities as engines of economic growth through improvement in the quality of urban infrastructure, with assured service levels and efficient governance. SBM aims to address the challenges in management of municipal solid waste and to support cities in developing modern and appropriate systems.

The Ministry of Environment Forests & Climate Change has replaced the MSW (M&H) Rules, 2000 and notified it in 2016 as Solid Waste Management(SWM) Rules, 2016'. The Ministry of Urban Development has also parallelly revised the MSWM Manual, 2000. The revised manual is based on 16 years of learning experience gained in India post the publication of its first edition in 2000.