

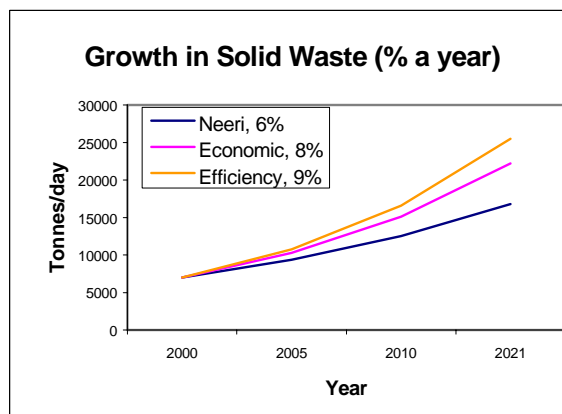
10. Solid Waste Management

10.1 Goals and Long Term Objectives

10.1.1 Clean, Healthy Streets and Neighbourhoods

Cleaner cities attract people and investment. Cleanliness is an indicator of good urban management. Poor solid waste management practices affect the health and amenity of cities in several ways:

- by transmitting disease to residents and waste workers
- by clogging drains and sewers
- through contaminated leaching
- through visual and smell impacts.



The present municipal waste production in the NCTD is approximately 7,000 tonnes per day. Growth assumptions in the Box above, of 6%, 8% (economic growth plus 2%) or adding 1% for collection efficiency, will result in a major expansion of waste. Thus, the quantity of waste produced in 2021 would be between 17,000 and 25,000 tonnes per day. Even if it was possible to provide the maximum reduction of waste through composting and incineration there would still be a minimum 20% residue of 4,000-5,000 tonnes per day that would have to be landfilled in 2021.

10.1.2 Benchmarked Improvement in Collection

Who says a locality is clean? Ultimately it is the residents. This demands a contract or charter between the responsible public

authority and citizens. A charter requires policing. This may be done by a service level agreement for a collection and transport service be it public or commercialised.

Benchmarking is a way to monitor and evaluate service levels. It may be done by comparison to best practice elsewhere in India or, within Delhi, between competing zones. Competition in quality and incentives for good performance might increase service standards.

10.1.3 Regulated Improvement in Treatment and Disposal

Transfer, treatment and disposal of waste are big business. High profits may be made by short-cutting adequate standards by either the public or private sector. Ensuring against this requires effective regulations of accepted and constantly improving standards. A powerful and accountable regulator will ensure good practice in the bulk downstream business of waste management. It must ensure best economic practice to minimise environmental damage from:

- water and air contamination
- unsightly developments
- transport inefficiency.

Enforced and time-bound improvements in collection efficiency and treatment / disposal practices will reduce the risks of health damage and ensure better amenities for a growing Delhi.

10.1.4 Disposal in Sanitary Landfill

Incineration is expensive (Rs 3000/tonne compared to about Rs 300/tonne for sanitary landfill). Nowhere in the world has large scale composting proved economic and is dependable on a ready market for the product. So, the scope for waste reduction is limited. Landfill is the only economic option for the foreseeable future. Thus, even assuming moderate waste minimisation can be achieved, planning must allow for the disposal of at least

15,000 tonnes of municipal waste per day by 2021. During the next 20 years this would require over 800 Ha (2,000 acres) of land. There is no shortage of land in public ownership but there are competing uses for that land. A solution might require the co-operation or joint development of municipal refuse disposal sites outside the NCTD with DMA towns.

10.1.5 Improved Sustainability

Cleanliness must be paid for. Residents are willing to pay for private cleaners and better standards. Waste, which is costly to manage, must be reduced as much as is economical through waste recycling and minimisation.

Waste Minimisation

- Use of cloth and paper bags, not plastic
- Large plot holders to have small compost pits in their own landscaped areas
- Segregating wastes in the house with the municipality to provide separate containers for recycleable waste
- Separate collection from large generators of organic wastes, like mandis, sent for composting. Combustible wastes from timber markets or industries sent to 'waste to power' generating centres

There are great opportunities for India to pioneer waste minimisation programmes. It should develop waste management businesses that can compete with other international contractors globally.

10.2 Policy Framework

10.2.1 Develop and Apply the Existing Laws

There is no shortage of legislation governing solid waste management. These are:

- biomedical waste regulations (see below)
- hazardous waste regulations (see below)
- draft solid waste regulations (revised).

Legislation must support phased improvements towards nationally accepted targets. The laws need to be enforced. Today that enforcer is the Supreme Court because there is a vacuum in environmental enforcement. Tomorrow an effective environmental regulator must

ensure that targeted improvements are achieved.

Apply Polluter Pays Principle

The policy – 'making polluters pay' needs to be enlarged. All polluters should have the prime obligation to take care of their own waste. This may be applied in two phases:

- by extending the obligation to all commercial waste generators, and subsequently
- by making residents pay the full costs of service.

Making the polluter pay may be by applying adequate charges for a public service or by enforcing the minimisation or management of their own waste. Either policy requires strict limitation of fly-tipping (illegal dumping). Laws against fly tipping must be developed and more stringently enforced.

10.2.2 Separate Environmental Regulatory and Service Delivery Functions

Environmental regulation must be separated from the executive functions of solid waste management. The Municipal Authorities are the key responsible agencies for municipal waste. But others who are also responsible under existing legislation are:

- commercial sector (public and private), but only in the management of their hazardous wastes
- bio-medical sector, but only in the disposal of clinical waste.

The new regulatory policy would cover both these enterprises as well as the municipal bodies. The solid waste regulations would require periodic amendment, and enforcement, to enable constantly improving standards in solid waste management.

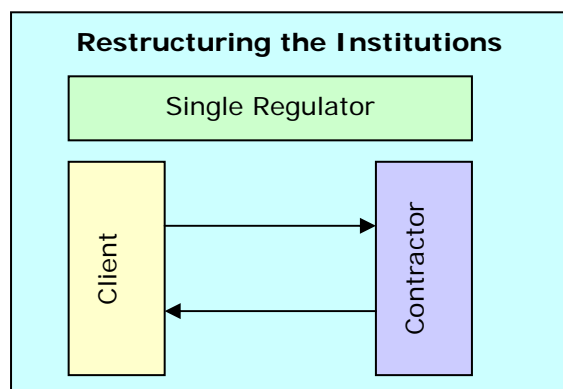
10.3 Institutional Framework

10.3.1 Effective Monitoring and Enforcement

Solid waste management needs effective environmental monitoring and a strong

regulator. For this the DPCC would need to be strengthened and properly resourced.

It would be able to view all waste management as an integrated whole. It should also be active in persuasion to achieve improved levels of waste pollution abatement. In addition it would have the powers to take legal action against either or both the contractor and the client for causing environmental pollution or poor management.



Thus, the municipal authorities would require strong managerial capacities to manage and control the private operators.

10.3.2 Use the Legal System to Effect Polluter Pays Principle

The wide gap between a persuasive policy of achieving objectives and the use of constitutional legal remedies must be bridged. An effective environment agency for Delhi that polices the provisions of the Environment Protection Act would have the power to fine polluters (subject to judicial appeal) and to itself initiate court proceedings.

10.3.3 Use PSP Institutions to Execute Reform

Private Sector Participation (PSP) must be used as an agent for change. There is solid evidence that PSP may achieve substantial cost savings with improved quality of service. PSP does not mean privatising solid waste management. PSP will mean using "Third Sector" organisations such as CBOs and NGOs as well as the commercial sector. Such initiatives as exist in Chennai, Bangalore and other cities may serve as models. Public private partnerships (PPPs)

are internationally used to build and operate large downstream reduction and disposal facilities. Contracting out to the commercial or "third" sector is better advanced elsewhere in India.

All these PSP possibilities may secure capital finance and better management. They are not however a free lunch. The capacities of local bodies to manage service contracts must be created. They are the clients for any likely PSP initiative. They, as clients, must be enabled to negotiate toughly and manage expertly with their contractors who they will pay. Advantages from developing those skills may make them better managers of in-house operations.

10.4 Bio-medical Waste

10.4.1 Overview

It is assessed that the biomedical waste generation is around 20-25 tonnes per day of which much finds its way into municipal receptacles and is disposed of along with municipal waste. This leads to health hazards for municipal workers and rag pickers with environmental impacts.

Biomedical Rules (Handling Management) 1998 have been notified by Govt. of India. As per these rules, all Institutions generating biomedical wastes have to take steps to ensure that such wastes are handled without any adverse effect on human health and environment.

Most of the large hospitals in Delhi have provided incineration facilities and in some cases autoclaving facilities but these facilities are close to residential areas and are potential environmental hazards. However, medium and small hospitals and nursing homes have not provided such facilities.

10.4.2 Objectives and Long Term Goals

The Long Term Goal is to protect the environment and the health of the general public by proper disposal of bio-medical waste.

The fundamental objectives of the project are to improve the separation, collection treatment and disposal of bio-medical wastes. The key objectives are:

- To require units generating biomedical waste to separate bio-medical contaminated waste at source for collection and external treatment.
- Development of the appropriate treatment and disposal sites.
- Provide awareness and training to the concerned staff and the operators.

10.4.3 Policy Framework

All the bio-medical waste generators are required to conform to relevant regulations. It is their responsibility to store and transport and dispose of the waste.

10.4.4 Institutional Framework

There are a large number of small clinics and private hospitals in the NCT that do not have the capacity to set up and operate individual treatment facilities. The Department of Health Services or the municipal authorities could license private contractors to set up treatment facilities on a BOT basis. GNCTD or the municipal authority could provide the appropriate land. The user would pay the user charges. The municipal authority or the DoHS would manage the contract and the DPCC would monitor and regulate the activities.

10.5 Hazardous Solid Waste

10.5.1 Overview

There is no up to date inventory or detailed study of hazardous waste generated by industry in the NCT. Most of the industrial units in Delhi are small scale units and much of the hazardous solid waste will be in the form of sludge from CETP's and individual ETP's. The biggest problem are small scale pickling units, electroplating and anodising and dyeing units and vehicle service stations. According to a rough estimate the quantum of waste could be as high as 30,000 tonnes/year or about 100 tonnes/day. This quantity could be reduced through waste re-processing enforced

through a strong monitoring and regulating process with appropriate charging for treatment and disposal of the waste generated.

10.5.2 Objectives and Long Term Goals

The long term goal is the protection of the environment and public health from the illegal disposal of toxic and hazardous industrial waste.

The fundamental objectives are to:

- Ensure that all industrial units that use hazardous materials and chemicals dispose of their waste in a properly controlled manner
- Reduce the quantity of wastes that has to be disposed of through long term containment
- Improve environmental performance of industrial units in regard to the management of hazardous solid wastes.

10.5.3 Policy Framework

All industrial units are required to conform to hazardous waste (Management and handling) Rules 1989. It is their responsibility to store, transport and dispose of the hazardous waste. The polluters are fully responsible for management of hazardous wastes. However, most of the industrial units are too small to organise the management of their wastes effectively.

The Honorable Supreme Court has directed that major polluting industries should be re-located out of the NCT. However, the GNCTD has appealed to this directive on the grounds of the financial hardship that would be imposed on small industrial units.

The GNCTD through the DSIDC is constructing a number of CETPs for treating industrial effluents but there is no facility for treating or disposing of sludges produced, which might be toxic or hazardous. Waste disposal facilities should also be provided in order to prevent the illegal dumping of dangerous wastes.

10.5.4 Institutional Framework

It is the responsibility of the DPCC to monitor the collection and disposal of hazardous waste. The DPCC can also remove operating licenses and close industrial units that do not comply with the environmental regulations.

An inventory of hazardous waste production should be developed from the register of industries to be prepared by the Department of Industry.

Following the preparation of the inventory, the municipal authorities or the DSIDC should, through the licensing of a private contractor in a PSP contract, develop the system of collection and disposal facilities for hazardous wastes. For this an amendment would be required in the Municipal Act to transfer the management responsibility. The land would be provided by the GNCTD or the municipal authority, the monitoring and regulation would be under the supervision of the DPCC.

Each industry producing hazardous wastes would be charged an appropriate rate dependent on the volume and toxicity of the waste produced. The charge rates should be set at levels that not only cover the cost of site operation and long term maintenance but also act as incentives to encourage waste minimisation through on-site treatment facilities to reduce the quantity of wastes needing long term containment.

10.6 Investment Programme

10.6.1 Municipal Waste

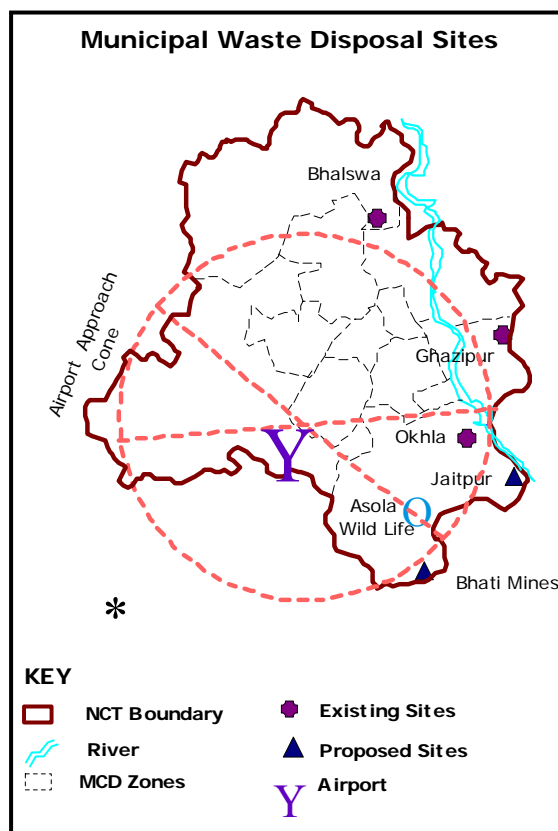
Successful improvement in solid waste management in Delhi requires investment in both upstream and downstream activities. Upstream improvements in collection efficiency will inevitably lead to greater quantities of waste deliveries downstream. Downstream changes in reduction and disposal may act as a key to spread change upstream.

The investment programme will force these synergies. It is also designed to be a catalyst for changes in policy and

management practices. These are far more important than investment outputs for the long term sustainability of the sector.

In the **municipal waste** stream, investment will begin in providing landfill for the irreducible minimum of disposal. Two large landfill sites need to be commissioned within the next 5 years.

A parallel investment will “roll out” proven collection and reduction methods across all MCD zones. In the immediate term three large zones should be improved using different approaches.



10.6.2 Bio-medical and Hazardous Wastes

For both bio-medical and industrial hazardous waste, centralised treatment / disposal facilities need to be developed within the next 3 years through PSP contracting.

10.6.3 Investment Costs

Table 10.6.3 provides an indication of projected costs for solid waste management development at base 2000 prices.

Table 10.6.3: Indicative Costs for Solid Waste Management Investments (at 2000 base prices)

Programme	Investment (Rs million)	Outcomes
Short Term (0-5 Years)		
Performance & financial management systems (Technical Assistance) Concentrating on PSP Building management & public information systems	20	Long term resource management improvement within short term targets International credit rating for MCD
Trials of collection & waste reduction of municipal waste In 3 trial zones Pioneering in Delhi 3 proven approaches Giving experience for the future programme	From existing resources	Public demonstration of improvements Test results of performance & financial management Comparison between options
Minimum bulk disposal & treatment of municipal waste Using zero public cost waste reduction where appropriate Development of new landfill capacity to the north & south of city Providing better main haulage to disposal sites using transfer stations	2,955 1,240	Platform to reduce fly tipping Learning by doing major project management Comparison between institutional options
Development of centralised treatment of Bio-medical waste through PSP	20	Facilities provided for smaller clinics and hospitals. Existing incinerators in large hospitals could be decommissioned at end of life.
Development of centralised treatment of Hazardous waste through PSP	50	Inventory required to determine facility and size requirements
Sub-total	4,285	(US\$ 95 million)
Medium Term (5-10 Years)		
Roll-out new collection & reduction schemes	2000	Serve all Delhi including non-MCD areas Secure unit cost savings
Further disposal site development	2,500	Competition on sites gives cost savings
Sub-total	4,500	(US\$ 100 million)
Long Term (10-20 Years)		
Collection & reduction schemes expanded	2000	Serve all Delhi including non-MCD areas as city expands Secure unit cost savings
Further disposal site development	7,000	Competition gives cost savings
Sub-total	9,000	(US\$ 200 million)
TOTAL (indicative cost in Rs million)	17,785	(Approx. US\$ 395 million)

Source: MCD/DUEIIP