

# COMPREHENSIVE REPORT



# DELHI SOLID WASTE MANAGEMENT

Post-COVID Modernization Era

(FY 2021-22 to FY 2024-25)



MATERIAL RECOVERY FACILITY



WASTE TO ENERGY





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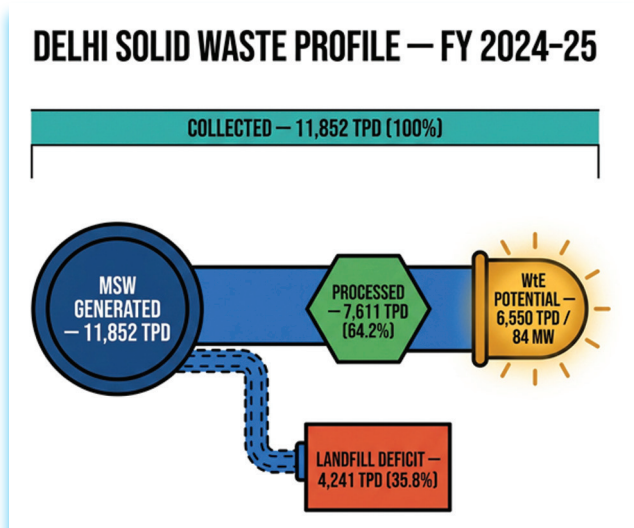
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# 1: EXECUTIVE SUMMARY, INTRODUCTION & BACKGROUND

## 1.1 Executive Summary

During the multi-year modernization window spanning from FY 2021–22 to FY 2024–25, the National Capital Territory (NCT) of Delhi navigated deep operational and structural shifts to manage its municipal solid waste (MSW). City-wide waste generation expanded from a baseline of 11,108 tonnes per day (TPD) in FY 2021–22 to 11,852 TPD by FY 2024–25. This structural growth represents a net 6.7% expansion in total load, fueled by rapid demographic changes, shifting consumption patterns, and an estimated population benchmark scaling up to 2.26 crores across the Municipal Corporation of Delhi (MCD) jurisdiction.



Urban local bodies (ULBs) sustained a commendable 100% municipal collection and transport efficiency rate throughout this four-year sequence. Concurrently, scientific waste treatment and disposal infrastructure registered significant

additions. Fresh daily waste processing scaled up from 5,280 TPD (47.5%) in FY 2021–22 to 7,611 TPD (64.2%) in FY 2024–25.

Despite this processing expansion, a net deficit of 4,241 TPD continues to require dumping at legacy landfills. Remediation of historical burdens accelerated, with cumulative bio-mining volumes reaching 158.02 Lakh Metric Tonnes (LMT) by April 2025 across the Bhalaswa, Okhla, and Ghazipur dumpsites.

## 1.2 Report Context & Rationale

This comprehensive review charts the chronological trajectory of Delhi’s solid waste tracking across consecutive, post-pandemic operational cycles. It captures major administrative, structural, and technical milestones, including:

- The unification of regional municipal local bodies.
- The deployment of new Waste-to-Energy (WtE) grid capacity.
- The operationalization of modern Engineered Sanitary Landfills (SLFs).
- The rigorous tracking of groundwater and leachate parameters around historical dumping mounds.

Operations during this frame progressed under close statutory monitoring by the Hon’ble Supreme Court in Writ Petition (C) No. 13029 of 1985 (M.C. Mehta vs. Union of India & Ors.) and the Solid Waste

Monitoring Committee (SWMC) originally constituted on February 16, 2023.

### 1.3 Administrative Structure & ULB Reorganization

The structural paradigm of urban

governance in Delhi evolved distinctly over this period:

Following this consolidation, the unified MCD emerged as the primary operational stakeholder, directly managing approximately 97% of the total solid waste generated across the capital.

Operational Phase	ULB Count	Local Body Designations	Administrative Context
MY 2021-22	5	North DMC, SDMC, EDMC, NDMC, DCB	Fragmented corporate boundaries with independent annual reporting streams.
FY 2022-23 Onward	3	MCD (Unified), NDMC, DCB	Consolidation of North, South, and East entities into a unified Municipal Corporation of Delhi.



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<https://timesofindia.indiatimes.com/city/delhi/no-dhalaos-by-2024-end-ngt-panel-fixes-deadlines-on-tackling-waste-in-delhi/articleshow/99771512.cms>

## 2: WASTE GENERATION, COLLECTION & TRANSPORTATION SYSTEMS

### 2.1 City-Wide Waste Generation Trends

Annual consolidated data indicates that

the gross waste stream expanded steadily, driven primarily by the rising load within the MCD boundary lines:

Municipal local Body (ULB)	FY 2021-22 (TPD)	FY 2022-23 (TPD)	FY 2023-24 (TPD)	FY 2024-25 (TPD)
MCD (Unified Boundaries)	10,800 (Combined)	11,000	11,000	11,500
NDMC (New Delhi)	236	287	280	290
DCB (Delhi Cantonment)	72	65	62	62
Total Net Generation	11,108	11,352	11,342	11,852
Collection Metrics Achieved	11,108 (100%)	11,352 (100%)	11,342 (100%)	11,852 (100%)

### 2.2 Key Trends & Analysis

- Tonnage Growth Analysis:** Total daily generation grew by 744 tonnes over the baseline. This 6.7% net increase is heavily linked to intense economic expansion, the introduction of single-use industrial packaging, and urban density changes.
- Collection Triumphs:** All three active municipal local bodies maintained a consistent 100% primary collection level throughout the tracking period. This was achieved through continuous door-to-door sweeping routines and mechanized vehicle deployment.
- ULB Variances:** NDMC waste fluctuated slightly before settling at

290 TPD, while DCB remained stable at 62 TPD. MCD experienced the most acute strain, absorbing an extra 500 TPD load within its single jurisdiction between 2022 and 2025.

### 2.3 Collection & Transportation Infrastructure

To stay ahead of the city’s expanding waste load, municipal logistics infrastructure underwent significant modernization, primarily across the MCD’s 1366.89 sq. km operating area:

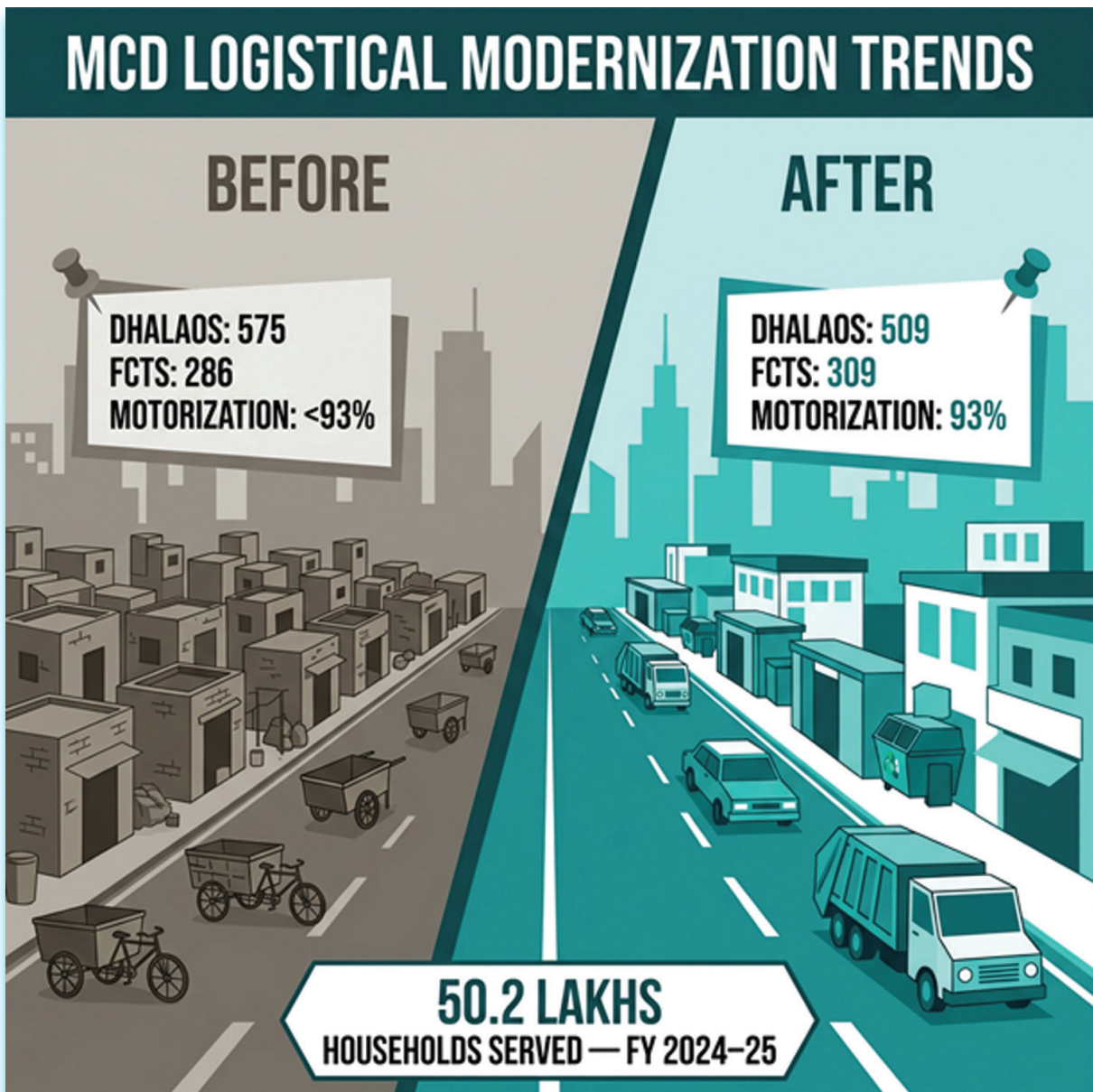
- Source Segregation Realities:** Source segregation progress varied significantly by local body. NDMC achieved a highly successful 92–95% compliance rate across its

14 circles. DCB maintained 90% segregation inside civilian pockets alongside 60% inside military zones. Conversely, the high-capacity MCD region lagged behind, registering a city-wide average segregation level of 59%, with full compliance targeted for January 2027.

- **Fleet Mechanization:** By the close of FY 2024–25, primary collection logistics relies on 2,543 auto tippers, 222 heavy hook loaders, 184

mechanized lifters, and 909 clean e-rickshaws, driving total vehicle fleet motorization to an unprecedented 93%.

- **Decentralized Innovations:** To scale down the burden on centralized plants, the city introduced decentralized strategies, establishing 633 verified “Zero Waste Colonies” alongside 3,076 Bulk Waste Generators (BWGs) tasked with managing in-situ organic waste treatments.



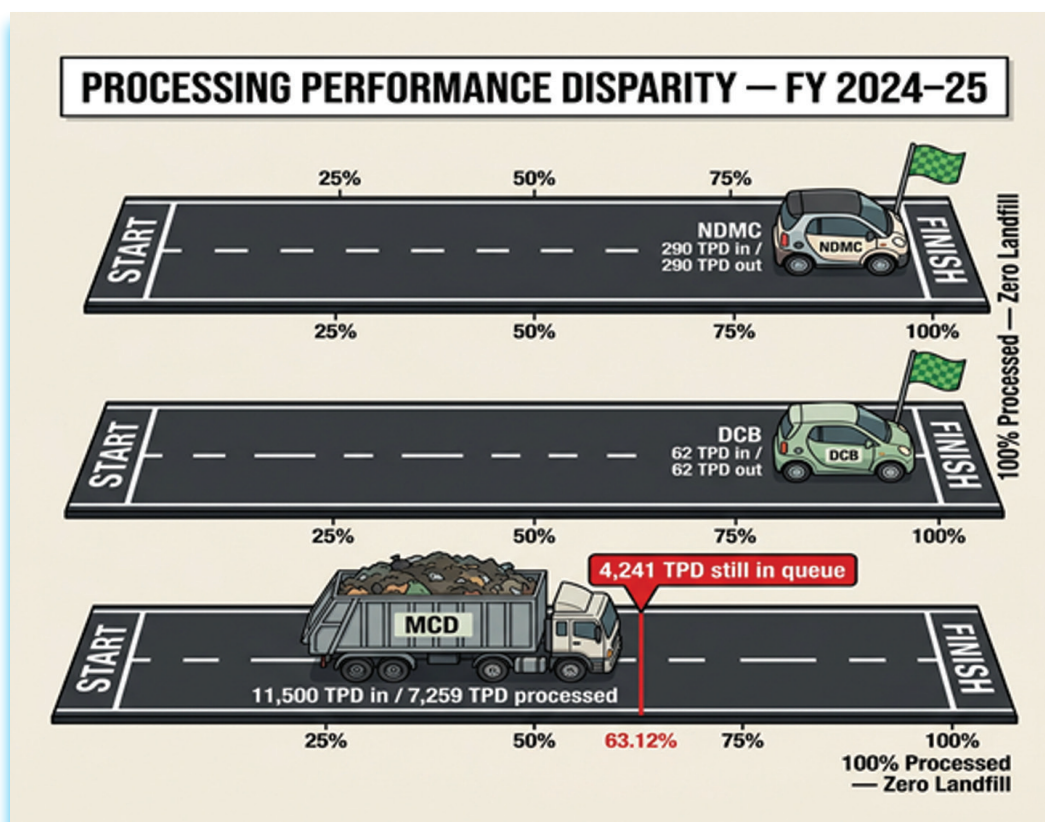
### 3: WASTE PROCESSING, TREATMENT TECHNOLOGIES & WTE INFRASTRUCTURE

#### 3.1 Waste Processing Efficiency Trends

The volume of municipal solid waste receiving scientific processing in the

NCT of Delhi scaled up markedly from its FY 2021-22 baseline. However, the net capacity curve reflects a widening deficit as gross waste generation outpaces current processing boundaries:

Parameter	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Gross Generated Waste (TPD)	11,108	11,352	11,342	11,852
Scientifically Processed (TPD)	5,280	7,352	7,542	7,611
Net Processing Rate (%)	47.5%	64.76%	66.5%	64.2%
Unprocessed Tonnage to Landfills (TPD)	5,828	4,000	3,800	4,241
Bawana SLF Inert/Rejects Load (TPD)	450	341	336	345



## 3.2 Waste-to-Energy (WtE) Infrastructure Evolution

Thermal incineration coupled with grid power delivery represents the primary mechanical processing pillar of the capital. The operational framework spans four active high-capacity units:

- **Timarpur-Okhla WtE Plant:** Processes 1,950 TPD of mixed municipal waste to yield a steady 23 MW grid output. Out of this capacity, 1,550 TPD is allocated to MCD, and 400 TPD is shared between NDMC and DCB.
- **Narela-Bawana WtE Plant:** Situated inside the Integrated SWM Facility, treating 1,300 TPD for a 24 MW output.
- **Ghazipur WtE Plant:** Treats 1,300 TPD for a 12 MW power configuration. This unit was entirely shut down on November 9, 2021, for an extensive

systemic revamp, resuming full operations on June 15, 2022.

- **Tehkhand WtE Plant:** Officially granted its formal Consent to Operate (CTO) and authorization on October 7, 2023, following commissioning phases. The plant stabilizes 2,000 TPD to supply 25 MW to the regional grid.
- **Net Grid Potential Progress:** Collective grid power capabilities scaled from 59 MW across 3 plants in FY 2021–22 to 84 MW across 4 plants by FY 2024–25, marking a definitive 42.4% increase in energy recovery.

## 3.3 Planned & Proposed SWM Processing Additions

To fill the structural gap of 3,679 TPD between design capacity and daily generation, a series of infrastructure expansions have been mapped out by the MCD:

S. No.	Proposed SWM Facility Upgrade	Capacity Addition	Target Time-line	Status & Regulatory Hurdles (As of Mid-2025)
1	New WtE Plant at Narela-Bawana	+3,000 TPD	Nov 2028	Environmental Clearance (EC) accorded by MoEFCC on 18.06.2025. Shifting of three 400 KV transmission lines underway via a ₹23.27 Cr payment to Power Grid.
2	New WtE Plant at Ghazipur	+2,000 TPD	Dec 2028	DERC order dated 06.06.2025 permitted transparent bidding under the Electricity Act, 2003. Review process active regarding custom policy guidelines.
3	Okhla WtE Plant Expansion	+1,000 TPD	Mar 2027	EC granted on 09.03.2023. DERC approved the revised tariff on 09.07.2024. A ₹50 Cr Viability Gap Funding (VGF) allocation is being routed through SBM (U) 2.0 tracks.
4	Tehkhand WtE Plant Expansion	+1,000 TPD	Dec 2027	Approved by the Corporation. Concessionaire application for Terms of Reference (ToR) filed with MoEFCC on 28.10.2024 and remains under review.
5	Okhla Bio-CNG Plant Installation	+300 TPD	Dec 2025	Executed in place of a closed, legacy 200 TPD composting unit. Under active construction.
6	Ghogha Dairy CBG Facility	+100 TPD	Aug 2025	Designed for dedicated livestock waste processing grids.
7	Ghazipur CBG Facility	+350 TPD	Dec 2026	Change of Land Use (CLU) successfully notified by MoHUA on 30.06.2025.

## 4: LANDFILL MANAGEMENT, BIO-MINING & LEGACY WASTE REMEDIATION

### 4.1 Dumpsite Profiles & Structural Baselines

Three historical, non-engineered

dumpsites dominate the topography of Delhi. The weight calculations derived in July 2019 estimated a total legacy burden of 280 Lakh Metric Tonnes (LMT):



To provide strict volumetric tracking unaffected by moisture and compaction shifts, a formal **Drone Volumetric Survey** was executed in June 2022. This drone

sweep established a structural, above-ground volumetric baseline of **203 LMT** across the territory (Ghazipur: 85 LMT, Bhalaswa: 73 LMT, Okhla: 45 LMT).

## 4.2 Bio-Mining Operations Cumulative Progress

Remediation metrics indicate a steady

expansion in material handling. Cumulative legacy clearance advanced from 45.65 LMT in March 2022 to 158.02 LMT by April 2025, marking a 246% increase in cumulative remediation volume:

Legacy Remediation Parameters	Bhalaswa Dumpsite	Okhla Dumpsite	Ghazipur Dumpsite	Consolidated Total
Drone Survey Baseline (LMT)	73.00	45.00	85.00	203.00 LMT
Fresh Inflow Added (Jul 22–Apr 25)	28.42	21.41	16.63	66.46 LMT
Net Tonnage Bio-Mined (Jul 22–Apr 25)	52.50	35.48	17.55	105.53 LMT
Cumulative Bio-Mined (Since Oct 2019)	76.84 LMT	53.06 LMT	28.12 LMT	158.02 LMT
Audited Completion Share (%)	96.05%	88.43%	28.08%	56.43% (Net Avg)
Remaining Waste Mounds (LMT)	48.92	30.93	84.08	163.93 LMT
Active Mechanical Trommels	22	11	25	58 Units
Revised Remediation Targets	December 2027	March 2027	September 2028	—

**Logistical Adjustments:** In December 2024, the MCD initiated a second phase of integrated bio-mining targeting a total quantity of 80 LMT (extendable by 40 LMT) under SBM 2.0 parameters. Daily processing rates scaled up to a range of 20,000–25,000 TPD, utilizing real-time tracking dashboards integrated with RFID toll endpoints. Land reclamation efforts successfully cleared 25 acres at Bhalaswa and 10 acres at Okhla, with portions transformed into dense bamboo plantations.

## 4.3 Engineered Sanitary Landfills (SLFs)

To transition away from unscientific, open-mound dumping, the city doubled its engineered storage framework:

- **Bawana Engineered SLF:** Remained

continuously active, operating with structural lining systems, environmental gas vents, and automated leachate capture grids.

- **Tekhhand Engineered SLF:** Developed across a 32.346-acre footprint backed by an original environmental clearance dating to 28 October 2019. The infrastructure was officially commissioned on March 12, 2024, designed specifically to receive and isolate the bottom ash generated by the adjacent Okhla and Tekhhand WtE plants.

## 5: ENVIRONMENTAL IMPACT, REGULATORY FRAMEWORK & JUDICIAL OVERSIGHT

### 5.1 Environmental Impact & Water Quality Monitoring

The environmental footprint of legacy dumpsites remains under intensive observation by the DPCC Water Laboratory. Audited laboratory data from the comparative tracking campaigns reveals distinct pollution levels:

#### Groundwater Quality Data Trends (TDS and Sulfate Tracking)

Groundwater samples extracted from monitoring wells surrounding the primary disposal facilities confirm high contamination levels relative to acceptable drinking baselines. All chemical parameters are recorded in **mg/l**:

- Bhalaswa Landfill Vicinity:** Testing wells at Bhalaswa Dairy recorded a steep spike in Total Dissolved Solids (TDS), rising from **2,160 mg/l** in December 2021 to **4,100 mg/l** in May 2024, and reaching **4,374 mg/l** by December 2024—nearly 9 times the safe drinking standard of **500 mg/l**.
- Ghazipur Landfill Vicinity:** The observation node at Dairy House No. 48 exhibited the most critical deterioration, with TDS peaking at **5,020 mg/l** in May 2024 and expanding to **5,102 mg/l** by December 2024.

- Okhla Landfill Vicinity:** Active test tracks directly at the Okhla Landfill core demonstrated a sharp multi-year contamination incline, with TDS climbing from **894 mg/l** in late 2021 to **2,760 mg/l** in May 2024, and settling



at **2,902 mg/l** during the December 2024 laboratory run.

#### Untreated Leachate Quality Fingerprint (May 2024 Audit)

Direct chemical sampling of untreated leachate pools at landfill boundaries shows heavy organic loads, far exceeding land disposal thresholds. All parameters are in mg/l except pH:

Landfill Node	pH	TDS	TSS	COD	BOD	Chloride
Standard Limit (Land Disposal)	5.5–9.0	2,100	200	—	100	600
Okhla South Dumping Site	7.9	4,240	820	9,720	3,250	1,191.6
Gazipur North/East Pool	8.1	4,380	1,360	7,560	3,125	711.7
Bhalswa Northern Base	7.9	4,580	1,030	5,040	2,250	641.8
Bawana Leachate Tank	7.2	4,770	1,060	5,400	2,125	707.7

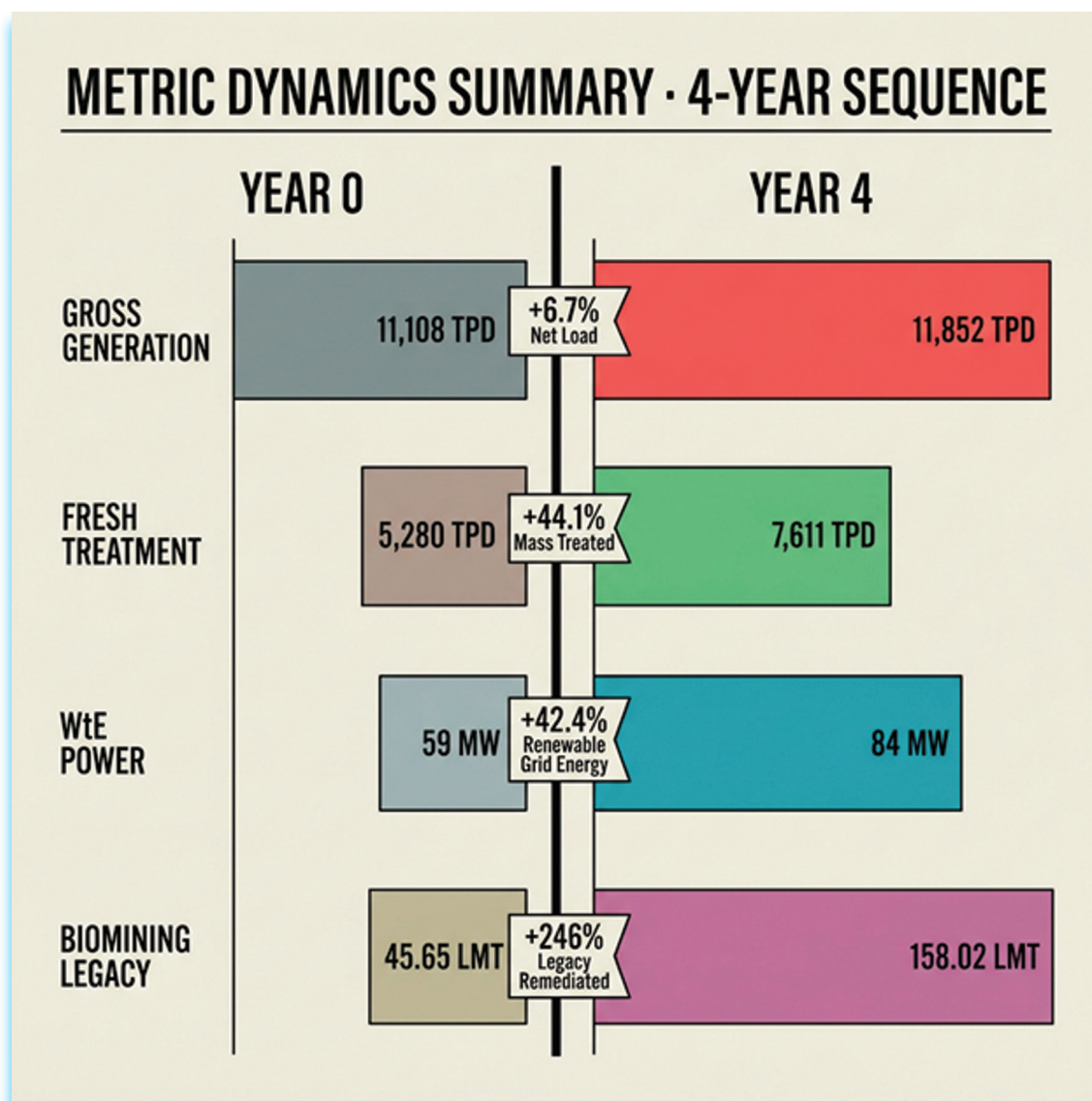
## 5.2 Regulatory & Judicial Framework

Solid waste management operations across the NCT of Delhi are governed by a multi-layered regulatory architecture:

- Supreme Court Oversight:** Under Writ Petition (C) No. 13029 of 1985 (M.C. Mehta vs. Union of India & Ors.), the Hon'ble Supreme Court actively monitors air pollution indices and municipal waste infrastructure delivery timelines. Following top-level coordination directives, the DPCC conducts monthly review meetings with urban local bodies and files continuous compliance briefs to national environmental agencies.
- Solid Waste Monitoring Committee (SWMC):** Originally constituted via a National Green Tribunal (NGT) decree on February 16, 2023, under OA No. 606/2018, the committee is headed by the Hon'ble Lt. Governor of Delhi, with the Chief Secretary serving as convener. A legal appeal challenging this committee's framework was formally withdrawn before the Hon'ble Supreme Court on May 23, 2025, solidifying the operational mandate of the SWMC.
- DPCC Enforcement Action:** On July 8, 2025, following rigorous joint inspections executed alongside central authorities, the DPCC served formal show-cause notices imposing Environmental Compensation of ₹5 Lakh each on the Waste-to-Energy installations at Ghazipur, Bawana, and Tehkhand due to effluent and emissions deviations. Concurrently, statutory policy directives issued under Section 5 of the Environment (Protection) Act, 1986 mandated all WtE operators to achieve 100% ash recycling into brick manufacturing and construction subgrades to completely phase out open ash dumping.

## 6: PERFORMANCE SCORECARD, CHALLENGES & RECOMMENDATIONS

### 6.1 Four-Year Performance Scorecard (FY 2021–22 vs. FY 2024–25)



A technical evaluation of the performance vectors across the core tracking period yields the following structural status:

- Primary Waste Collection:** Grade A | Maintained a flawless 100% efficiency profile across all regional sectors

consistently over the four fiscal cycles.

- Processing Capacity Growth:** Grade B+ | Treatment infrastructure grew, raising the municipal processing share to 64.2%. However, it remains short of the 90% sustainability baseline due

to the rapid growth of the city's waste stream.

- **MCD Source Segregation:** Grade B | Successfully pushed average source segregation compliance to 59% by FY 2024–25, transforming historically low performance boundaries.
- **Legacy Waste Remediation:** Grade B- (Divergent) | Displays highly polarized performance. While Bhalaswa (96.05% completion) and Okhla (88.43% completion) are near total clearance, the massive Ghazipur mound remains a critical choke point at just 28.08% remediation.
- **Infrastructure Project Delivery:** Grade D | Hampered by long-term administrative delays. Core treatment expansions and new plant installations face timeline slippages extending 7 to 8 years past original schedules.

## 6.2 Critical Challenges & Bottlenecks

1. **The Ghazipur Dumpsite Stagnation:** Representing the most complex waste challenge in the capital, Ghazipur holds a massive 84.08 LMT balance mound above ground level. Severe space limitations, slow mechanical tendering adjustments, and historical funding gaps have extended its complete remediation timeline out to September 2028.
2. **The Chasing-the-Target Phenomenon:** Between July 2022 and April 2025, local local local bodies dumped 66.46 LMT of fresh, unsegregated waste directly onto

active bio-mining sites. This constant incoming stream dilutes remediation progress, spikes daily methane generation risks, and extends landfill dependence.

3. **SWM Land Scarcity:** Dense socioeconomic stratification across the capital creates intense public resistance to new, decentralized waste transfer points and processing facilities, slowing down route optimization and localized composting expansion efforts.

## 6.3 Strategic Recommendations

1. **Enforce Fresh Waste Diversion:** Strictly prohibit the dumping of fresh, unsegregated waste at legacy landfills. All raw municipal collections must be routed to integrated processing hubs and operational engineered sanitary landfills like Bawana and Tehkhand.
2. **Fast-Track Scheduled WtE Expansions:** Implement monthly monitoring dashboards for high-capacity projects, including the 3,000 TPD Narela-Bawana plant and the 1,000 TPD Okhla grid expansion, to ensure swift commissioning by their revised 2027–2028 targets.
3. **Deploy Localized In-Situ Infrastructure:** Mandate advanced source-segregation checks at all 309 Fixed Compactor Transfer Stations (FCTS) and launch localized aerobic composting grids across the city's zero-waste colonies to reduce the transportation load on centralized sites.

- 4. Strengthen Groundwater Aquifer Protection:** Upgrade landfill boundaries with deep interceptor drains, continuous leachate extraction pumps, and advanced multi-stage treatment configurations to systematically reverse heavy chemical infiltration into local groundwater tables.

## 6.4 Analytical Conclusion

Delhi's solid waste management framework from FY 2021-22 to FY 2024-25 highlights a period of significant infrastructure

modernization, yet the system remains incomplete. The successful doubling of engineered sanitary landfills, a 42.4% increase in green energy grid potential and a cumulative bio-mining volume of 158.02 LMT show clear progress. However, with **4,241 TPD of fresh waste** still sent to landfills daily, achieving a sustainable, zero-landfill urban ecosystem requires full source segregation, strict infrastructure delivery timelines, and the complete diversion of raw waste away from remediated dumpsites.



[www.hindustantimes.com/gurgaon/bandhwari-poison-is-spreading-fear-residents/story-qIfxNhioDT69V2yELwyhYM.html](https://www.hindustantimes.com/gurgaon/bandhwari-poison-is-spreading-fear-residents/story-qIfxNhioDT69V2yELwyhYM.html)

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