GUIDANCE DOCUMENT

Technology Selection for **Decentralised and Centralised Solid Waste Management** in Small Urban Local Bodies

(Town Municipal Councils and Town Panchayats)

In compliance with Solid Waste Management Rules, 2016 and the SWM Framework, 2026

Applicable to: Town Municipal Councils (TP/TMC-Grade 2, TMC-Grade 1, CMC-Grade 2) and Town Panchayats (TP) in Karnataka

This document has been prepared and submitted as a guidance reference for DMA Karnataka

2026



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Abbrevations

AMC	–	Annual Maintenance Contract
AMRUT	–	Atal Mission for Rejuvenation and Urban Transformation
BMZ	–	German Federal Ministry for Economic Cooperation and Development
CapEx	–	Capital Expenditure
CBWTF	–	Common Biomedical Waste Treatment Facility
CMC	–	City Municipal Council
CPCB	–	Central Pollution Control Board
C/N	–	Carbon-to-Nitrogen Ratio
CSWAP	–	City Sanitation and Waste Action Plan
CTE	–	Consent to Establish
CTO	–	Consent to Operate
DMA	–	Directorate of Municipal Administration
DPR	–	Detailed Project Report
DWCC	–	Dry Waste Collection Centre
EC	–	Environmental Clearance
EIA	–	Environmental Impact Assessment
EPR	–	Extended Producer Responsibility
HOPCOMS	–	Horticultural Producers' Cooperative Marketing and Processing Society
IEC	–	Information, Education and Communication
KSPCB	–	Karnataka State Pollution Control Board
LAC	–	Local Aggregation Centre
MRF	–	Material Recovery Facility
MSW	–	Municipal Solid Waste
NADEP	–	Narayan Deotao Pandharipande (Aerobic Composting Method)

O&M	–	Operation and Maintenance
OpEx	–	Operational Expenditure
PIBO	–	Producer, Importer and Brand Owner
PRO	–	Producer Responsibility Organisation
PTS	–	Proposal Tracking System
PWP	–	Plastic Waste Processor
RDF	–	Refuse Derived Fuel
SCF	–	Scrap Combustible Fraction
SEIAA	–	State Environment Impact Assessment Authority
SLTC	–	State Level Technical Committee
SPCB	–	State Pollution Control Board
SWM	–	Solid Waste Management
TMC	–	Town Municipal Council
TP	–	Town Panchayat
TPD	–	Tonnes Per Day
ULB	–	Urban Local Body
WFD	–	Waste Flow Diagram
WtE	–	Waste-to-Energy

Acknowledgement

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This Guidance Document on Technology Selection for Decentralised and Centralised Solid Waste Management in Small Urban Local Bodies (Town Municipal Councils and Town Panchayats) has been developed to support Urban Local Bodies in Karnataka in selecting appropriate, sustainable, and context-specific solid waste management technologies.

We express our sincere gratitude to the Directorate of Municipal Administration (DMA), Government of Karnataka, for its leadership, guidance, and continuous support in the development of this document. We also acknowledge the valuable contributions of Urban Local Bodies (ULBs), whose experiences, operational insights, and feedback have helped shape the recommendations and practical approaches presented in this guidance.

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Finally, we thank all government officials, technical experts, practitioners, and stakeholders who contributed their knowledge, expertise, and valuable feedback during the preparation and review of this publication. We hope this guidance serves as a useful reference for Urban Local Bodies and other stakeholders in strengthening sustainable and efficient solid waste management practices across Karnataka.

Executive Summary

India is undergoing a rapid urban transition: by 2036 it is projected to have 600 million urban residents - roughly 40% of its population, up from 31% in 2011. This expansion will drive a steep rise in waste generation, from 62 million tonnes annually in 2020 to an estimated 435 million tonnes by 2050. How effectively this waste is managed will directly shape urban livability, public health, and the environmental sustainability of India's cities.

Recognising this, India has made substantial progress on this front over the past decade. Under the Swachh Bharat Mission-Urban, scientific processing of municipal solid waste has risen roughly fivefold - from about 16% in 2014 to over 50% in 2025 - supported by near-universal door-to-door collection and large-scale expansion of solid waste infrastructure. These national gains, however, are unevenly distributed; the small-town category consistently trails national averages. Collection coverage falls below 50% in smaller cities, against 70–90% in large ones, processing below 30% as compared to 50% nationally.

Additionally, India's regulatory framework, the SWM Rules and the Swachh Bharat Mission-Urban, has been calibrated to large-city conditions: waste volumes that justify centralised infrastructure, revenue bases that can absorb capital costs, and administrative cadres with technical depth. Successive urban missions, have reinforced this by prioritising Class I cities for infrastructure funding, leaving smaller towns to compete for residual resources. As more small cities emerge and waste volumes rise, it is critical to design solid waste policies and guidelines suited to the context of these small cities.

This is particularly consequential in Karnataka, where small towns constitute the overwhelming majority of the urban governance structure. Of the state's 315 urban local bodies (ULBs), only a 10 are City Corporations; the remaining comprise



of 59 City Municipal Councils, 116 Town Municipal Councils, and 97 Town Panchayats. This Guidance Document, prepared by BORDA South Asia and Foundation for Inclusive and Sustainable Habitats for the Directorate of Municipal Administration, Karnataka responds to that gap. Its purpose is not to prescribe a single technology but to give small ULBs a basis for selecting solutions matched to their scale, waste composition, and delivery capacity - translating the intent of the SWM Rules, 2016 and 2026 into choices these towns can realistically finance, operate, and sustain. It proposes that for the small-town context, strengthening operational fundamentals - source segregation, cost recovery, O&M, and market linkages for recovered material - yields greater returns than capital investment in large-scale processing infrastructure. For example – the document recommends steering away from large waste-to-energy infrastructure for small towns by design. Field experience across Karnataka ULBs, including Chikkaballapura and Chintamani, confirms that technology fails not on engineering grounds but where these enabling conditions are absent. It thus offers the DMA and its ULBs a practical, replicable basis for selecting waste management systems suited to the small-town context.



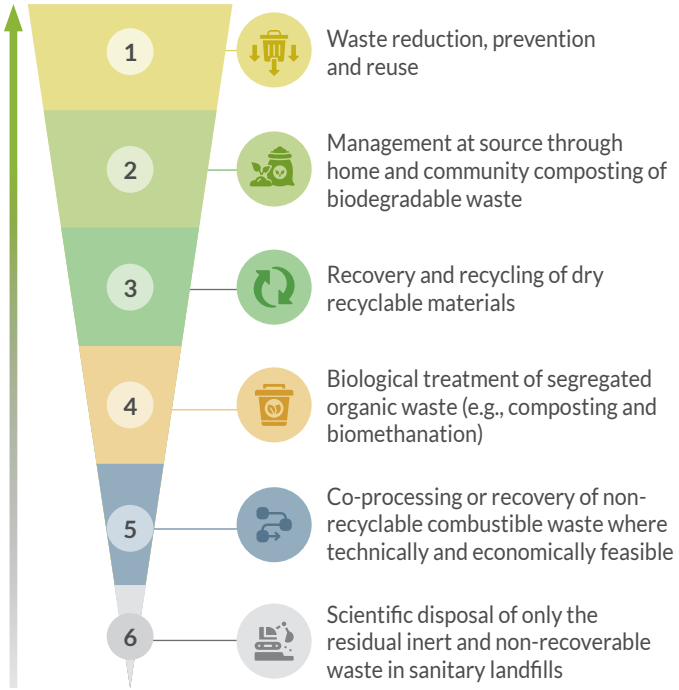
1.

Purpose and Scope

Solid waste management, aligned with the principles of the Circular Economy, entails establishing systems that maximise resource recovery from generated waste. The fundamental step for maximum resource recovery from waste is source segregation, followed by regular collection and appropriate technologies for processing waste and extracting resources. Selection of the right technologies for waste processing or pre-processing is often a challenge for small urban local bodies (ULBs), as this depends on multiple factors such as quantity and quality of waste, availability of land and funds with the local bodies, technical capacity to run the facility, demand and markets for the end products, etc.

Technology selection should be viewed as one component of an integrated solid waste management system rather than the starting point. Before investing in waste processing infrastructure, ULBs should prioritise actions that minimise waste generation, maximise source segregation, and recover resources at the highest possible value. The selection of processing technologies should therefore follow the waste management hierarchy, ensuring that only the residual waste streams requiring treatment are directed to appropriate technologies.

The preferred order of interventions is:



The choice of technology should therefore be based on the quantity and characteristics of the waste remaining after waste reduction, segregation, reuse, and recycling measures have been implemented. Investments in processing facilities should complement these upstream interventions rather than replace them.

This guidance document is intended to assist decision-makers of ULBs including Municipal Councils and Town Panchayats (TPs) as well as district-level commissioners and DMA officers, in selecting appropriate waste processing technologies for solid waste management. It is designed to translate the regulatory framework of the Solid Waste Management Rules, 2016 and the SWM Rules, 2026, into actionable, site-specific technology choices for small urban local bodies in Karnataka with a population of less than 1 lakh.

The document provides a structured decision matrix covering:

- Characterisation of town types by population and waste generation scale
- Technology options for wet/organic waste
- Technology options for dry/recyclable waste
- Indicative capital and operating costs, land requirements, skill requirements, and outputs
- Enabling conditions that must be in place for any technology to succeed

This document does not prescribe a single solution. Technology selection must be contextualised to each town's waste composition, available land, institutional capacity, and access to product markets. The matrices in this document provide criteria for that contextualised decision-making. While the document provides indicative CapEx and OpEx values, ULBs are encouraged to evaluate technologies based on lifecycle costs rather than initial capital investment alone.

Appropriate technology selection alone cannot guarantee successful solid waste management. Technology selection cannot compensate for weaknesses in service delivery, governance, or source segregation; ULBs should delay capital investment until prerequisites are met.

2.

Town Classification and Waste Generation Estimates

The small towns in Karnataka (< 1 lakh population) have been categorised into 3 classes or grades based on the Census of India population[1] and the Karnataka Municipal Administrative Service (Cadre and Recruitment) Rules, 2022 grades.[2]

Based on primary and empirical data collected from Karnataka, the approximate range of waste generation and the proportion of wet (organic), dry (inorganic and non-hazardous), sanitary and special care waste is presented in the table below. These numbers are indicative; the actuals might differ from town to town and hence need to be audited on the ground.

1 https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=82502&reg=48&lang=2
2 https://udd.karnataka.gov.in/uploads/media_to_upload1p,, categorisedopulation and744115458.pdf

Table 1: Population-Based Classification of Towns and Indicative Waste Characteristics

Town Category	Population Range	Estimated Waste Generation	Wet Waste %	Dry Waste %	Sanitary & Special Care
Town Panchayat / TMC Grade 2	5,000 – 20,000	0.5 – 5 TPD	55–65%	20–30%	10–15%
TMC-Grade 1 / Medium Nagar Panchayat	20,000 – 50,000	5 – 10 TPD	50–60%	25–35%	10–15%
CMC-Grade 2 / Large Nagar Panchayat	50,000 – 1,00,000	10 – 30 TPD	45–55%	30–35%	10–20%

Note: Waste composition figures are indicative based on CPCB guidelines and Karnataka field assessments. Actual wet waste fraction may be higher in towns with active wet markets or lower in predominantly residential settlements. A primary waste characterisation study is recommended before infrastructure investment.

A key parameter for technology selection is the ratio of biodegradable (wet) waste to dry recyclable waste. The higher the wet fraction, the greater the imperative to deploy biological treatment at scale. The higher the dry fraction, the more critical becomes an effective Dry Waste Collection Centre (DWCC) infrastructure and recycler linkage.

3.

Technology Selection Matrix - Wet / Organic Waste

Organic or wet waste constitutes the largest fraction of municipal solid waste generated in most small towns. When mixed with other waste streams, it contaminates recyclable materials, reduces resource recovery potential, increases greenhouse gas emissions, and results in avoidable quantities of waste being disposed off in landfills or dumpsites. Effective source segregation is therefore the foundation for successful wet waste management.

Biological treatment technologies, including composting and biomethanation, are the preferred options for managing segregated organic waste. Technology selection should be based on local waste quantities, waste characteristics, land availability, institutional capacity, operational capability, and long-term financial sustainability rather than on population alone.

ULBs should prioritise source-level management wherever feasible through home and community composting, particularly for individual households, gated communities, institutions, and bulk waste generators. Home composting units are available in the market at approximately 1500 Rs/unit with

Table 2: Technology Selection Matrix - Wet Waste

Technology	Ideal Scale	CapEx ₹ (Indicative)*	Space Required	OpEx (Indicative)**	
Community Composting (lane – 1–2/Ward)	0.2 TPD (ward level)	50,000 per unit	< 50 sq ft per unit	< 0.5 Rs/Kg (managed by sweepers/ collection staff)	
Ward-Level / Decentralised Composting (NADEP Aerobic bin)	0.1–0.5 TPD per ward	4 – 17 L	500–1500 sq ft	1-.1.5 Rs/Kg (One manpower)	
Ward-Level / Decentralised Composting (Windrow) (>80% segregation)	2–5 TPD	20–25 L	5000–6000 sq. ft	1-1.5 Rs/Kg (3 manpower – full time)	
Centralised Aerobic Composting (Windrow / Static Pile) (>80% segregation)	5–30 TPD per plant	₹25 L – 1.2 Cr per site	6000–50,000 sq. ft	1.5-2 Rs/Kg 5 man power + 1 supervisor	
Vermicomposting (Bed / Pit system) (>95% segregation)	0.1–1 TPD	₹1.5–15 L	1500–8,000 sq ft	1.5-2 Rs/Kg (one manpower)	

**CapEx figures are indicative (2024–25 rates) and will vary with site conditions, contractor rates, and technology vendor. State Finance Commission grants, 15th Finance Commission grants, state schemes, municipal funds, and convergence funding should be the primary funding source for CapEx.*

80 Kg capacity (3 buckets of 20 Kg). Capacity-building programmes, technical guidance, and appropriate incentives can significantly reduce the quantity of wet waste requiring collection and centralised processing. Where permitted under applicable regulations and suitable local arrangements exist, clean biodegradable market waste may also be diverted for beneficial uses such as animal feed, reducing the burden on municipal processing facilities.

In general, decentralised biological treatment systems are often more appropriate for smaller ULBs due to reduced transportation requirements and simpler operation, while centralised facilities may be considered where adequate waste quantities, land, technical capacity, and operational resources are available. The above matrix presents the principal technology options for wet waste management, comparing their applicability based on processing capacity, land requirements, capital and operating costs, skill requirements, and suitability across different categories of Urban Local Bodies.

	Skill Level	Output	Suitable for	Key Remarks
	Basic	Compost (used for maintenance of public gardens)	TP TMC Grade 1	› Best for last-mile wet waste diversion. No skilled ops needed.
	Low (trained operator)	Compost (3–5 Rs/Kg)	TP TMC Grade 1	› Suitable for rural areas. Needs a shredder to improve the composting process and reduce the smell.
	Basic	Compost (3–5 Rs/Kg)	TP TMC Grade 1	› Needs compost forward linkage (HOPCOMS, nurseries, agriculture dept).
	Moderate (plant supervisor + helpers)	Marketable compost (meets SWM Rules 2026 standards – 3–5 Rs/Kg)	TMC-Grade 1 CMC-Grade 2	› Turner needed for proper aeration, but this will increase the OpEx. › Needs compost forward linkage (HOPCOMS, nurseries, agriculture dept). › Land requirement is the biggest constraint.
	Moderate (earthworm management skill)	Vermicompost (Rs 7–10/Kg)	TP	› Temperature-sensitive (20–30°C ideal). Avoid peak summer zones without shade. Higher compost value than aerobic. › Suitable for market/horticulture waste. › Contaminants in urban waste kills the worms. › Needs to be combined with tank composting (for preprocessing) for best results.

***Indicative OpEx vary depending on labour costs, degree of mechanisation, transportation distance, electricity tariffs, and local operating conditions. The values presented are intended for comparative purposes only.*

Biomethanation

Biomethanation is a biological treatment technology that enables the recovery of renewable energy and organic nutrients from segregated biodegradable waste. The biogas produced can be utilised for cooking, electricity generation, thermal applications, or upgraded for other energy uses, depending on the scale of the facility and local requirements. Besides reducing the waste requiring disposal, biomethanation contributes to greenhouse gas emission reduction by capturing methane that would otherwise be released through uncontrolled decomposition.

Feedstock quality critically impacts plant performance and output. The success of biomethanation depends on a consistent supply of well-segregated biodegradable waste with minimal contamination. Woody, fibrous, and slow-to-degrade materials may require size reduction or pre-treatment before digestion. Wet waste or food waste generated from hotels, hostels, markets, institutions, and other bulk generators are more suitable for biomethanation. Biomethanation generates digestate (around 80–90% of the mass fed into a digester exits as digestate slurry), which should be appropriately managed

through dewatering and curing before utilisation as an organic soil amendment, subject to applicable quality standards. In large-scale systems, the generated digestate slurry can be processed into nutrient-rich organic manure using a slurry decanter. Biomethanation is suitable where a reliable quantity of segregated organic waste (> 99 %), skilled operators, and long-term operation and maintenance support are available.

Table 3: Biogas Technology Options

Biogas Technology	Scale (range)	CapEx	Space*	OpEx	O&M	Output	Suitability	Remarks
Geo Membrane Plastic digestors (Fibre Reinforced Plastic)	0.1–1 TPD	6–32 lakhs	54–2200 sq. ft	0.8-2.5 Rs/Kg	1 operator 4–5 hours	Biogas piped supply + Slurry	TP & TMC Grade 1 (cluster-based)	Viable when there is a local piped supply demand
Mild Steel portable structure	0.1–2 TPD	12–72 lakhs	86–1500 sq. ft*	1.5-5 Rs/Kg	2 operators	Biogas piped supply + Slurry	TP & TMC Grade 1 (cluster-based)	Viable when there is a local piped supply demand and market for slurry
Mild Steel portable structure	2–15 TPD	65 lakhs – 10 Cr	2700–160000 sq. ft	0.8-1.5 Rs/Kg	5 to 12 operators based on scale	Biogas piped supply + compost	CMC Grade 2**	Can be a single centralised processing facility or cluster-based units
Centralised Concrete structure	5–15 TPD (>15 TPD is also feasible)	48 lakhs – 8 Cr	3250–160000 sq. ft	1-1.6 Rs/Kg	5 to 12 operators based on scale	Biogas piped supply + compost	CMC Grade 2**	Centralised facility with LAC units preferred

**This does not include space for waste sorting and storage (600–1100 sq. ft/MT required for sorting and storage).*

***For local bodies with wet waste generation exceeding 5 TPD, decentralised, cluster-based biogas processing units can be deployed to minimise logistical costs, provided there is nearby market demand for piped biogas. Alternatively, a hybrid centralized/decentralized model — utilizing a centralized digester supported by decentralised pre-processing or aggregation units — can be considered. In this framework, transporting raw, bulky organic waste over long distances is economically and logistically inefficient. The Local Aggregation Centre (LAC) functions as the 'spoke' to the centralized digester's 'hub'. Implementing LACs with a 2–3 TPD capacity incurs a capital cost of 20–21 lakhs per unit, and these facilities can be easily operated and maintained by part-time, semi-skilled personnel.*

4.

Technology Selection Matrix - Dry / Recyclable Waste

Dry recyclable waste - comprising paper, plastic, metal, glass, and packaging materials - constitutes 25–35% of MSW in Karnataka's small towns. When properly segregated and channelled, this fraction can generate revenue, reduce disposal pressure, and connect ULBs to the formal recycling economy through Extended Producer Responsibility (EPR) mechanisms under the Plastic Waste Management Rules, 2022.

The primary infrastructure requirement for dry waste management is the Dry Waste Collection Centre (DWCC) - a designated, weather-proof space where sorted dry waste is aggregated, weighed, and handed over to registered recyclers or kabadiwalas. DWCCs are the non-negotiable baseline infrastructure for all town categories. More capital-intensive options (MRF, RDF, WTE) are appropriate only at higher waste volumes and under specific enabling conditions.

Waste-to-Energy (mass-burn incineration) and Plastic-to-Fuel (pyrolysis) technologies have not been included in the recommended technology options for TPs & TMCs. These technologies typically require

Table 4: Technology Selection Matrix – Dry Waste

Technology	Ideal Scale	CapEx (Indicative)	Space Required	OpEx/ tonne	
Dry Waste Collection Centre (DWCC – manual)	0.5–3 TPD per ward or cluster	₹25–75 L (infrastructure + equipment)	1000–5,000 sq ft	Low ₹12/Kg	
Material Recovery Facility (MRF) (semi-mechanised sorting)	5–30 TPD	₹1–10 Cr	7000–50,000 sq ft	Moderate ₹8/Kg	
****RDF Pelletisation (Refused Derived Fuel)**	2–15 TPD (high-calorific fraction only)	₹0.5–3 Cr	2000–15,000 sq ft	Moderate-High (4 Rs/Kg)	

Note: RDF should be produced only from segregated, non-recyclable combustible fractions after the recovery of recyclable materials.
RDF plant is still at pilot scales; the operational and financial viability of RDF plants should be carefully studied before setting up such plants



	Skill Level	Output	Suitable for	Key Remarks
	Low-Moderate (trained operators)	Segregated recyclables sold to scrap dealers/MRF	All types of local bodies	› Primary dry waste infrastructure for all town types. › If high value sold to scrap dealers then ULB should bear the cost of SCF/low value disposal. › If there is an MRF, DWCC should act as an aggregation centre with minimal sorting.
	Medium-High (equipment operator + mechanized sorters)	Sorted recyclable streams: Paper, plastic, metal, glass (Revenue)	TMC Grade 1 & CMC-Grade 2	› Feasible only with assured dry waste input volumes and reliable recycler tie-ups. Consider a regional MRF for smaller towns pooling dry waste. › SCF should sent to WtEs or cement plants (incurs OpEx).
	High (technical operator required – supervisors)	RDF pellets for cement kilns / co-processing (Rs 5/Kg – sale)	TMC Grade 1 & CMC-Grade 2	› Only viable if the calorific value of the dry fraction is consistently > 3,500 kcal/kg. Requires an institutional offtake arrangement, such as industrial boilers. Not recommended without secured end-use. › 30% of the total waste should be paper for the end product to have calorific value above 3500 kcal/Kg.

large and consistent quantities of segregated feedstock, significant capital investment, specialised operation and maintenance, and robust environmental monitoring systems. Where such technologies are considered, they should generally be planned as regional or cluster-level facilities serving multiple ULBs, following maximisation of waste reduction, segregation, recycling, and biological treatment.

Strictly, only non-recyclable, non-biodegradable, combustible waste should be sent to WtE plants. As per the SWM Rules 2026, segregated dry waste (non-recyclable) with a calorific value above 1500 kcal/kg should be sent to WtEs, and the minimum incineration temperature should be 950 degrees Celsius.

Plastic-to-Fuel technologies require highly segregated and relatively homogeneous plastic feedstock. Mixed municipal plastic waste, particularly contaminated multilayer plastics and composites, generally requires extensive pre-processing, reducing technical and economic viability.

5.

Technology Trade-off Guide: Choosing Between Comparable Options

Sections 3 and 4 set out the full range of technology options for wet and dry waste. Within each waste stream, however, ULBs frequently face a closer choice between two broadly comparable technologies - composting or biomethanation, a stand-alone DWCC or a feeder role to a regional MRF, RDF production or direct co-processing. This section provides decision-focused guidance for these specific trade-offs, to be read alongside the detailed specifications in Tables 2, 3, and 4.

5.1 Composting or Biomethanation

Composting and biomethanation are both suitable for segregated organic waste. The choice should rest on local capital availability, feedstock consistency, and whether there is assured nearby demand for biogas - not on population size alone. Composting should be treated primarily as a waste-treatment solution rather than a revenue stream; biomethanation carries higher upfront cost but adds renewable energy recovery where conditions support it.

Decision Drivers

Choose Windrow Composting When

- Capital budget is limited
- Land is readily available
- Waste quantities fluctuate seasonally
- Technical manpower is limited
- The objective is safe treatment of wet waste
- Feedstock contains some fibrous material
- There is no reliable demand for biogas nearby

Choose Biomethanation When

- Capital funding is available
- Land availability is limited
- A consistent quantity of segregated wet waste is available
- Skilled operators and O&M support are available
- The objective includes renewable energy recovery in addition to treatment
- Feedstock is clean, homogeneous, and well segregated
- There is a reliable, sustained demand for biogas within 1.5 km (e.g., hostels, canteens, institutions)

Indicative Economics at 10 TPD

Parameter	Windrow Composting	Biomethanation
CapEx	Lower	Higher
OpEx	~Rs 1-2/kg wet waste	Broadly comparable to composting
Output	Compost, ~20-30% of input mass	~800-1,200 m3 biogas/day (~340-540 kg LPG-equivalent) + digestate
Revenue potential	~Rs 3-5/kg compost, only if a market exists	LPG-equivalent value at ~Rs 90/kg market rate, plus digestate as manure subject to demand

Bio-CNG upgrading requires additional gas purification, compression, and storage infrastructure and is generally viable only for regional facilities above 150 TPD with assured off-take. Direct biogas utilisation is the more realistic option for most Town Panchayats and Town Municipal Councils.

5.2 Dry Waste Collection Centre (DWCC) or Material Recovery Facility (MRF)

DWCCs and MRFs are complementary, not interchangeable - a DWCC's role changes depending on whether it operates independently or feeds a centralised or regional MRF.

Functional Roles

DWCC

Primary Role
Decentralised aggregation, temporary storage, and (where no MRF exists) basic manual sorting at ward or cluster level



Typical Scale
0.5-3 TPD
per ward or cluster

MRF

Primary Role
Centralised or regional mechanised/ semi-mechanised sorting to maximise material recovery and hold economies of scale



Typical Scale
5-30 TPD
typically serving multiple wards or ULBs

Decision Guide

Operate DWCC as a Standalone Sorting Point When

- ULB is too small to justify a full-scale MRF
- Manual sorting and direct sale to scrap dealers is sufficient
- DWCC sells high-value recyclables directly
- Non-recyclable SCF is sent periodically to cement plants, RDF units, or authorised WtE

Operate DWCC as a Feeder to a Regional MRF When

- Multiple wards or neighbouring ULBs can together supply 5-30 TPD of dry waste
- Mechanised sorting would meaningfully improve recovery rates and revenue
- High-value recyclables are retained for the MRF - selling them at the DWCC undercuts MRF viability
- Consolidated dry waste volumes justify dedicated transport logistics to the regional MRF

This distinction refines, rather than repeats, the MRF row of Table 4. Table 4's remarks can be trimmed to a one-line pointer to this section to avoid duplication.

5.3 RDF Production or Direct Co-processing

Whether to invest in an RDF plant or to simply bale and transport the Scrap Combustible Fraction (SCF) to a cement plant depends primarily on end-market economics and assured off-take, not on waste quantity alone.

Decision Guide

Consider RDF Production When

- Nearby industrial boilers require RDF fuel
- A stable market exists for RDF pellets
- Long-term feedstock quality can be maintained

Consider Direct Co-processing When

- Cement plants are the only available end-users
- Waste quantities are insufficient to justify an RDF plant
- Transport to cement plants is economically feasible

Indicative Pricing and Quality Requirements

Buyer	Indicative Price	Minimum Quality Requirement
Industrial boilers	~Rs 7.5/kg	Calorific value consistently >= ~3,500 kcal/kg
Cement plants (co-processing)	~Rs 2.5/kg	Lower calorific threshold acceptable

Blending 20-30% non-recyclable or contaminated paper (or agricultural residue) may be needed to reach 3,500 kcal/kg. Recyclable paper must still go to the recycling stream, not into RDF blending, in line with the waste hierarchy. Under the SWM Rules, 2026, no recyclable, combustible, or biodegradable waste may be sent to landfill.

6.

Regulatory Requirements and Statutory Approvals for Technology Implementation

Technology selection, however well-matched to local waste characteristics, cannot be operationalised in isolation from the statutory framework governing its establishment. Every processing facility discussed in Sections 3, and 4 - irrespective of scale - is subject to one or more layers of regulatory clearance, and the sequencing of these approvals materially affects project timelines, eligibility for public funding, and long-term compliance standing. ULB officials are advised to treat statutory clearance not as a terminal formality following technology selection, but as a parallel workstream that should commence alongside DPR preparation.

This section sets out the four distinct approval mechanisms applicable to wet and dry waste processing infrastructure in Karnataka, clarifies which mechanism applies to which category of technology, and describes the procedure by which ULB projects are technically vetted and financially sanctioned under the Swachh Bharat Mission-Urban (SBM-U) 2.0 framework.

6.1 Overview of the Regulatory Framework

Four separate approval mechanisms govern the establishment of solid waste processing infrastructure. These are administered by different authorities, serve different regulatory purposes, and are not interchangeable; a facility may require more than one of these approvals simultaneously.

Table 5 : Statutory Approval Framework for SWM Technologies

Approval Mechanism	Competent Authority	Regulatory Purpose	Governing Instrument
Environmental Clearance (EC)	State Environment Impact Assessment Authority (SEIAA)	Determines whether the facility, by virtue of its scale or configuration, requires prior environmental appraisal before construction	Environment Impact Assessment Notification, 2006, Schedule Item 7(i)
Consent to Establish / Consent to Operate (CTE/ CTO)	Karnataka State Pollution Control Board (KSPCB)	Assesses the pollution potential (air, water, waste) of the specific unit prior to construction and commissioning	Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981
Registration and Authorisation	ULB, in coordination with KSPCB, through the centralised online portal of the Central Pollution Control Board (CPCB)	Establishes the facility as a recognised and compliant waste-processing unit, subject to ongoing reporting and audit	Solid Waste Management Rules, 2026
Technical and Financial Sanction	State Level Technical Committee (SLTC)	Reviews the technical soundness of the DPR and sanctions the project for release of SBM-U 2.0 funds	SBM-Urban 2.0 Guidelines

It is emphasised that EC, CTE/CTO, and SWM Rules registration are environmental compliance requirements applicable irrespective of the source of funding, whereas SLTC sanction is a financial and technical gatekeeping mechanism specific to projects seeking Central and State assistance under SBM-U 2.0. A project may therefore be environmentally compliant without being eligible for Mission funding, and vice versa; both tracks must be pursued concurrently.

6.2 Applicability of Environmental Clearance

Environmental Clearance (EC) is required only for large, integrated waste facilities. The table below sets out when EC applies and when it does not.

Governing Instruments	EIA Notification, 2006, Schedule Item 7(i) - Common Municipal Solid Waste Management Facility (CMSWMF), Category B
Approving Authority	State Environment Impact Assessment Authority (SEIAA)
Triggered By	Integrated facilities combining a sanitary landfill with municipal biomethanation, RDF processing, or waste-to-energy
Does NOT Apply To	Community composting, NADEP bins, ward-level windrow composting, vermicomposting, and standalone centralised composting (5-30 TPD) operating independently
Action for ULB	Engage SEIAA at the DPR stage - not after site development has commenced - if planning a combined/ integrated facility

6.3 Consent Management under the Water and Air Acts

Facilities that fall outside the EC requirement remain subject to consent management by KSPCB. Key points are summarised below.

Governing Instruments	Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981
Two-Step Process	Consent to Establish (CTE) prior to construction, followed by Consent to Operate (CTO) after inspection of the completed facility
Blue Category (2024-25)	CPCB now classifies composting, biomethanation, MRFs, and WtE plants as Essential Environmental Services, eligible for simplified consent processing and extended permit validity
Possible Exemption	Very small, community-level composting units may qualify for a self-declaration route in view of negligible pollution index
Action for ULB	Confirm KSPCB's local implementation of the Blue Category and the self-declaration threshold before estimating CTE/CTO timelines

6.4 Registration and Authorisation under the SWM Rules, 2026

The SWM Rules, 2026 (in force from 1 April 2026, superseding the 2016 Rules) introduce three requirements that directly affect technology implementation.

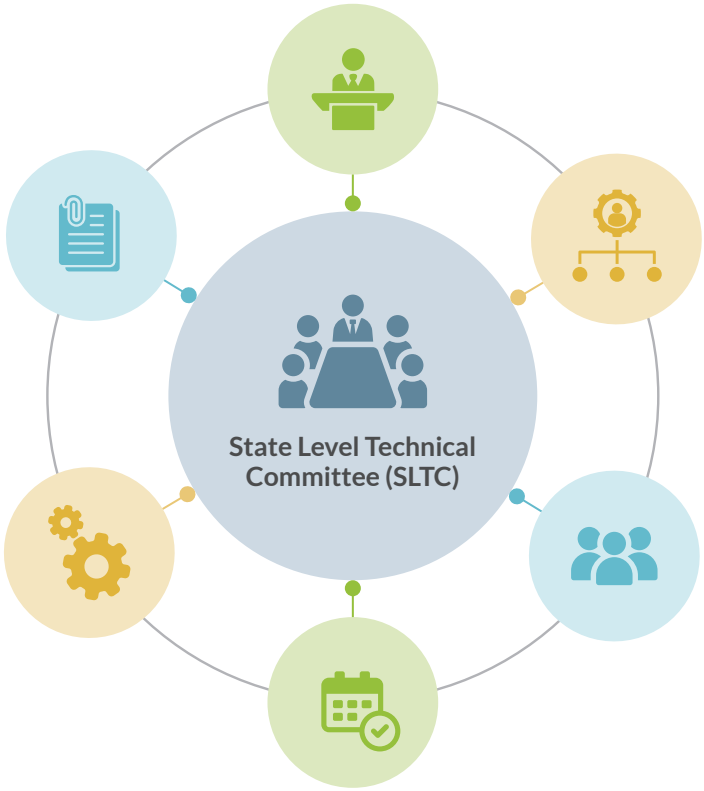
Effective Date	1 April 2026 - supersedes the Solid Waste Management Rules, 2016
Online Registration & Authorisation	Conducted through a centralised portal developed by CPCB, replacing the earlier multi-step physical process - applies to all facilities
Mandatory Buffer Zone	Required where installed capacity exceeds 5 TPD (dimensions notified by CPCB); applies to Ward-Level Windrow (2-5 TPD) and Centralised Aerobic Composting (5-30 TPD), not to sub-1 TPD units such as community composting or NADEP
Mandatory Audits	Periodic audits of all facilities, reports uploaded to the centralised portal; overseen by a State-level committee chaired by the Chief Secretary - distinct from the SLTC (Section 5.5)
Action for ULB	Complete portal registration before commissioning; build recurring audit compliance into O&M budgeting from the outset (see Table 6)

6.5 Technical and Financial Sanction: The State Level Technical Committee

Distinct from the environmental approvals above, projects seeking SBM-U 2.0 funding require sanction by the State Level Technical Committee (SLTC). Its composition and role are summarised below.

Chair

Principal Secretary, Urban Development



Karnataka secretariat (TP/TMC projects)

Administered through the Directorate of Municipal Administration (DMA)

Convenor

State Mission Director (SBM)

Core role

Reviews CSWAPs; provides technical scrutiny of DPRs; sanctions projects; approves upload to the Proposal Tracking System (precondition for release of Central assistance)

Members

Principal Secretaries - SBM-Grameen, Public Health Engineering, Finance, Environment & Forest; a KSPCB representative; a MoHUA representative; representatives of relevant parastatal entities (co-option permitted)

Meeting frequency

At least once every 3 months, or more frequently as required

No project proceeds to fund release without prior SLTC sanction. ULBs are advised to initiate SLTC engagement at the DPR drafting stage rather than after finalisation.

6.6 Funding Pattern and Conditions for Release under SBM-Urban 2.0

The Central Government's contribution toward SWM infrastructure - including composting plants, biomethanation facilities, MRFs, and transfer stations - is determined by ULB population category rather than a uniform ratio. It should be noted that the State's matching contribution is a statutory minimum, and the balance is intended to be met, in the first instance, through Fifteenth Finance Commission grants and Public-Private Partnership or Viability Gap Funding contributions, with ULB own-revenue serving as a residual rather than primary source, consistent with the funding sources identified in the footnote to Table 2.

Table 6: SBM-Urban 2.0 Fund-Sharing Pattern for Solid Waste Management Infrastructure

ULB Population Category	Central Share	Minimum State/UT Share	Balance (15th FC Grants / ULB Revenue / PPP-VGF)
Above 10 lakh	25%	16%	59%
1-10 lakh	33%	22%	45%
Below 1 lakh (applicable to TPs and TMCs under this guidance)	50%	33%	17%

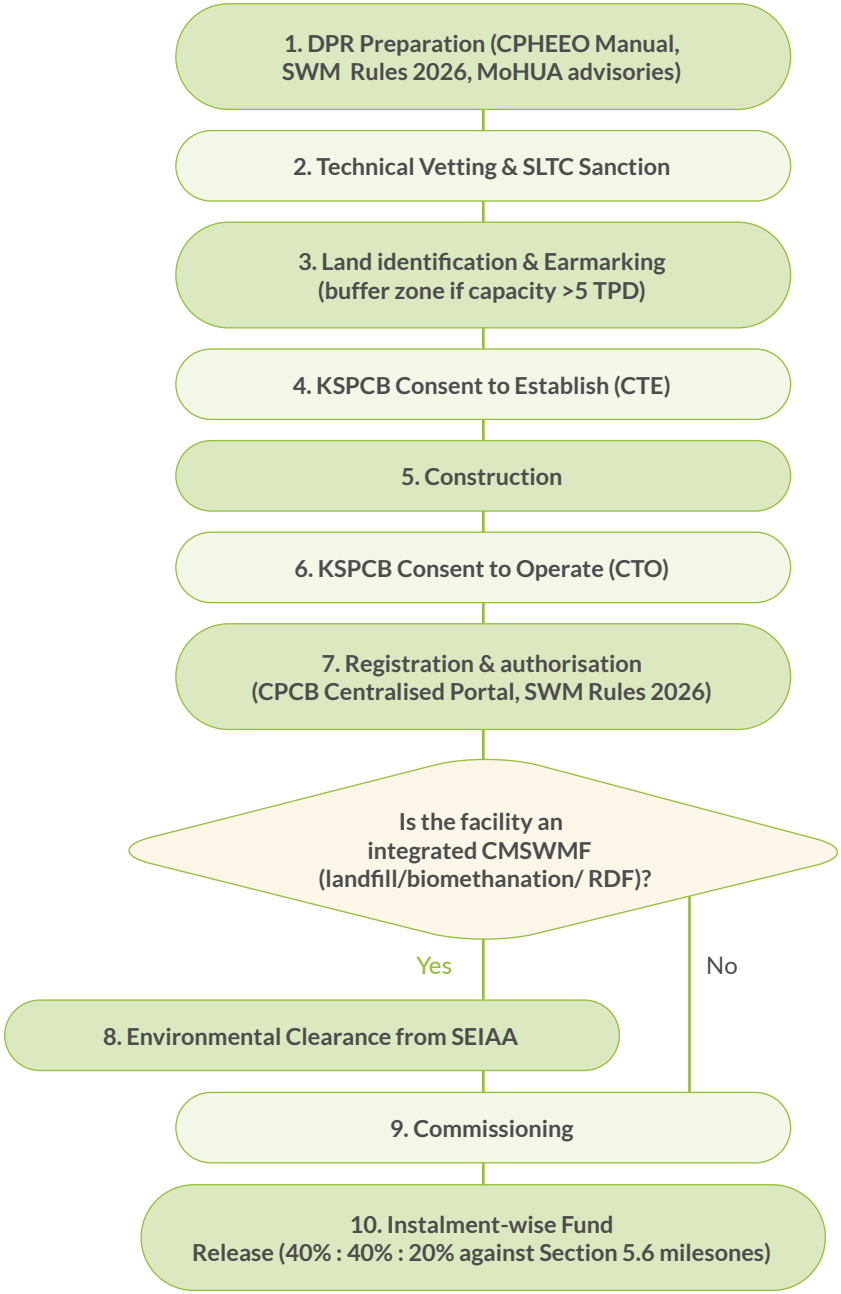
For the town categories addressed in this guidance - all falling below 1 lakh population per Table 1 - the applicable Central share is 50%, with a minimum State contribution of 33% and the remaining 17% to be sourced through Fifteenth Finance Commission grants, convergence funding, or ULB revenue, in line with Table 2's guidance on CapEx financing.

The Central share is released in three instalments of 40%, 40%, and 20% respectively, each contingent upon defined milestones: the first instalment requires SLTC approval of the CSWAP and confirmation that land has been identified and earmarked; the second requires a utilisation certificate for 75% of the first instalment and physical progress of at least 25%; and the third requires a utilisation certificate for 75% of the second instalment, physical progress of at least 60%, attainment of at least 1-star Garbage Free City certification, and demonstrated source segregation of at least 60% of municipal solid waste. ULBs and DMA should incorporate these milestones into project scheduling to avoid disruption to fund flow.

6.7 Recommended Sequence of Statutory Engagement

To minimise implementation delay, ULBs are advised to pursue the following sequence, initiating regulatory engagement concurrently with, rather than subsequent to, technology selection: preparation of the DPR in accordance with the CPHEEO Manual, the SWM Rules, 2026, and applicable MoHUA advisories; technical vetting and submission to the SLTC for sanction; identification and earmarking of land, inclusive of buffer zone requirements where capacity exceeds 5 TPD; application for KSPCB Consent to Establish; construction; application for KSPCB Consent to Operate; registration and authorisation through the CPCB centralised portal under the SWM Rules, 2026; application for Environmental Clearance from SEIAA where the facility constitutes an integrated CMSWMF; and commissioning, followed by instalment-wise fund release against the milestones described in Section 6.6.

Figure 1: Regulatory Approval Sequence for SWM Technology Implementation



Note: Steps 1 through 7 apply uniformly to all technologies described in Sections 3 and 4. The Environmental Clearance step (8) applies only where the facility constitutes an integrated Common Municipal Solid Waste Management Facility (CMSWMF) incorporating a sanitary landfill, RDF processing, or biomethanation component alongside other waste streams; standalone composting, vermicomposting, and decentralised biogas units proceed directly from Step 7 to commissioning.

7.

Recommended Technology Stack by Town Type

Based on the technology matrices above, the following table summarises the recommended integrated technology stack for each town category - combining wet waste treatment, dry waste management, and residue disposal in a coherent system. These are starting-point recommendations; actual configurations must be validated against site conditions.

In addition to authorised CBWTFs, several emerging technologies for the treatment and recycling of sanitary waste are becoming commercially available. E.g. PadCare (sanitary waste recycling) and NeoSan Neo X (decentralised sanitary waste treatment/ incineration); however, these examples should not be construed as recommendations or endorsements. While these technologies may offer opportunities for resource recovery and reduced disposal costs, they are still at varying stages of commercial maturity. Before adoption, ULBs should undertake a comprehensive technical, environmental, regulatory, and financial due diligence, including assessment of statutory approvals, environmental compliance, operational reliability, lifecycle costs, and market viability.

Table 7: Recommended Technology Stack by Town Type

Town Type / Scale	Wet Waste (Primary Technology Stack)	Dry Waste (Primary Technology Stack)	Sanitary waste	Special care waste
TP (< 20,000 pop) 0.5–5 TPD	Ward-level aerobic composting + Biogas for market/ canteen waste + Home composting push	1–2 DWCCs Sorted recyclables to scrap dealers	Tie up with the common biomedical waste treatment facility (CBWTF) (Rs 35/Kg)*	Sanitary landfill or a common regional facility
TMC-Grade 1 (20,000–50,000 pop) 5–10 TPD	Centralised composting (windrow) + Biogas cluster for wet markets + Decentralised vermicompost (ward-level)	1–2 DWCCs (city-level) + MRF if > 5 TPD	Tie up with the CBWTF (Rs 35/Kg)	Sanitary landfill or an authorised hazardous waste management vendor
CMC-Grade 2 (50,000–1,00,000 pop) 15–30 TPD	Centralised composting (windrow/static) + Biogas for institutions/ markets	MRF (mechanised) + DWCCs and RDF plant if cement plant or industrial boilers < 50 km	Tie up with the CBWTF (Rs 35/Kg)	Sanitary landfill or an authorised hazardous waste management vendor

**The Solid Waste Management Rules, 2026 recommend that sanitary waste collected separately by ULBs be channelised to authorised Common Biomedical Waste Treatment Facilities (CBWTFs) for environmentally sound treatment and disposal. However, the current treatment charges (approximately ₹35/kg in Karnataka) may pose a significant financial burden for small ULBs. The Directorate of Municipal Administration (DMA) may consider facilitating state-level or regional framework agreements with authorised CBWTF operators to DMA may facilitate regional framework agreements with authorised CBWTF operators to secure standardised and concessional treatment rates for smaller ULBs.*

8.

Enabling Conditions for Technology Success

Technology selection is a necessary but not sufficient condition for a functional solid waste management system. Field experience in Karnataka (including interventions in Chikkaballapur, Chintamani, and other ULBs) consistently demonstrates that the success or failure of waste processing plants is determined as much by enabling conditions as by the technology choice itself. The following table identifies the seven critical enabling conditions and the institutional actions required to establish them.



Table 8: Enabling Conditions

Enabling Condition	Why It Matters (Wet Waste)	Why It Matters (Dry Waste)	Institutional Action Required
Segregation at Source	Composting and biogas plants can only work with segregated wet waste. Contaminated wet waste reduces compost quality and biogas yield.	Recovery of recyclable and combustible materials from dry waste depends on source segregation.	Enforce mandatory source-segregation (SWM Rules 2026 & Supreme Court Order). Penalty upon non-compliance.
Land Availability	Large-scale centralised facilities need even land away from water bodies and habitation.	DWCC: 1000–5000 sq.ft. MRF: 5,000–50,000 sq. ft. Site must have road access and drainage.	District to assist in land identification. As per SWM Rules 2026, land reclaimed through biomining should be used for SWM after SPCB approval.
User fee	Revenue from compost or biogas alone is generally insufficient to recover the operation and maintenance costs of waste processing facilities. A sustainable user fee provides a predictable revenue stream for collection, transportation, processing, and facility maintenance.	Revenue from the sale of recyclable materials is often insufficient to cover the costs of collection, sorting, storage, and disposal of low-value or non-recyclable fractions. User fees help bridge this financial gap and improve the long-term sustainability of dry waste management systems.	ULBs should notify and periodically revise user fees through municipal bye-laws in accordance with the Solid Waste Management Rules. User fee structures should be designed to recover a reasonable share of service delivery costs while remaining equitable and financially sustainable.
Technical O&M Support	Mechanically intensive technologies such as biomethanation require trained operators, routine preventive maintenance, and timely repair to ensure consistent performance and avoid plant failure.	Equipment-based facilities such as MRFs and RDF plants require skilled operators and reliable maintenance support to minimise downtime and sustain recovery efficiency.	Before selecting any mechanically intensive technology, assess the availability of trained operators, technical service providers, AMC support, and spare parts. Preference should be given to technologies that can be sustainably operated using locally available technical capacity.

Enabling Condition	Why It Matters (Wet Waste)	Why It Matters (Dry Waste)	Institutional Action Required
Market Linkages for Recovered Materials	Compost, digestate, or biogas require reliable utilisation to ensure financial viability and uninterrupted plant operation.	Recyclables and combustible fractions require assured downstream markets and environmentally sound end destinations to avoid stockpiling and increased disposal costs.	ULBs should establish formal agreements with compost users, authorised recyclers, PROs, cement plants, and other approved end-users before commissioning processing facilities. District-level support may be required where local markets are weak. The disposal of SCF and the sale of RDF are conducive to the presence of Industrial Boilers or Cement factories in the vicinity. SWM Rules mandate the use of compost in public works. Fertiliser federations are mandated to co-market compost.
Extended Producer Responsibility (EPR) Integration	NA	Plastic packaging waste constitutes a significant proportion of the recyclable dry waste stream. Integration with the EPR framework can improve the financial viability of collection and channelisation of eligible plastic waste by connecting ULBs with authorised Producers, Importers and Brand Owners (PIBOs), Producer Responsibility Organisations (PROs), and registered Plastic Waste Processors (PWPs). Proper segregation, traceability and documentation are essential to realise these benefits.	ULBs should establish formal partnerships with registered PWPs, PROs, or PIBOs to ensure that eligible plastic waste is channelised through the CPCB EPR framework. District or State agencies may support smaller ULBs in aggregating plastic waste, maintaining documentation, and negotiating commercial arrangements that enable recovery of collection and processing costs under the EPR system.
Technical Body / Nodal Officer	Small ULBs lack dedicated SWM staff. Plant failure risk is high.	DWCC performance requires regular monitoring and maintenance of market linkages.	Each ULB must designate a trained SWM nodal officer. The district-level technical support cell (as recommended in the SWM Rules 2026) is critical for TPs.

9.

Data Requirements Before Technology Finalisation

Before any technology investment is approved or DPR commissioned, a detailed baseline assessment should be conducted to gauge the following details:

- Daily waste generation quantity (in TPD) - based on vehicle log, route weighment, or direct measurement
- Waste composition - percentage of wet organic, dry recyclable, and inert/reject fractions
- Wet waste characterisation - C/N ratio, moisture content (target 50–60% for composting), presence of contamination
- Dry waste composition - percentage of paper, plastic (by category), metal, glass, multilayer plastic
- Existing infrastructure - collection vehicles, bins, DWCCs, composting sites, dumping ground
- Land availability - identified site, tenure status (ULB/revenue/private), area in sq m
- Fund availability: CapEx and OpEx sources for SWM technologies should be identified.
- Nearest recycler or cement plant - distance, offtake capacity, willingness to tie up
- Technical operation and maintenance capacity – Availability of trained operators, local



technical service providers, Annual Maintenance Contract (AMC) support, and access to spare parts, particularly for mechanically intensive technologies such as biomethanation, MRFs, RDF plants, and other equipment-dependent systems.

A detailed waste flow assessment is recommended prior to finalising technology options and preparing DPRs. The application of analytical tools, such as a Waste Flow Diagram (WFD), helps clarify the pathways for waste generation, collection, recovery, and disposal across the town. Typically requiring 1–2 days of field data collection and stakeholder consultations, the exercise provides a reliable baseline for estimating waste quantities, composition, and material flows. The findings support informed decision-making, appropriate technology selection, infrastructure sizing, and investment planning, thereby improving the accuracy and effectiveness of proposed waste management interventions.

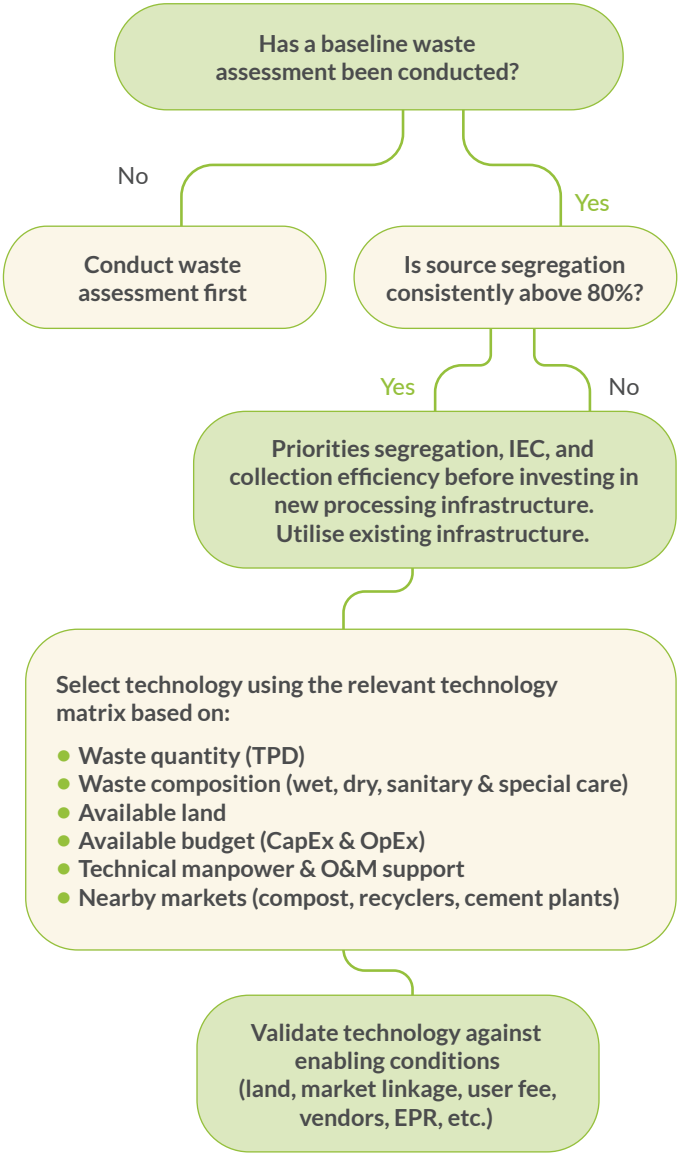
10.

Decision Tree for ULBs

The decision tree below consolidates the technology-selection logic set out in Sections 2 through 9 into a single navigational sequence. It is intended as a final pre-DPR check for ULB officials and DMA officers, confirming that the prerequisites for technology investment are in place before a specific technology or configuration is finalised. It does not replace the detailed matrices, enabling conditions, or regulatory requirements discussed earlier - each node below points to the section that governs it.



Figure 2 Decision tree for ULB



Reading the Tree: Node-by-Node

Decision Point	What It Is Checking	Full Detail In
Baseline waste assessment conducted?	Whether TPD, composition, and site data exist to size any technology correctly	Section 8, Data Requirements
Source segregation consistently above 80%?	Whether the town meets the minimum segregation threshold most technologies in this guidance assume	Table 2 (Windrow and Centralised Composting both require >80% segregation) and Table 8, Enabling Conditions
Select technology using the relevant matrix	Matching TPD, composition, land, budget, manpower, and market access against the criteria in this guidance	Tables 2 and 4, and the Technology Trade-off Guide
Validate against enabling conditions	Confirming land, market linkage, user fee, vendor availability, and EPR arrangements are actually in place, not just assumed	Table 8, Enabling Conditions

A technology that passes validation is ready to proceed to DPR preparation and statutory clearance, as set out in Section 6.

11.

Conclusion

Selecting an appropriate solid waste management technology requires a systematic assessment of local conditions rather than adopting standard or vendor-driven solutions. Waste quantity and composition, source segregation levels, land availability, financial resources, institutional capacity, availability of skilled operators, and access to markets for recovered products should collectively inform technology selection.

For small ULBs, improving operational performance often delivers greater benefits than investing in new infrastructure. Strengthening source segregation, collection efficiency, utilisation of existing facilities, user fee collection, and market linkages for compost and recyclable materials should be prioritised before considering capital-intensive processing technologies. New processing facilities should be established only where these enabling conditions are in place, and long-term operation and maintenance can be sustained.

Technology selection should also be evaluated from a lifecycle perspective, considering not only capital investment but also operational expenditure,



maintenance requirements, manpower needs, end-product utilisation, and environmental performance. Technologies that are technically appropriate but financially or operationally unsustainable are unlikely to achieve long-term success.

Sustainable outcomes depend on the combined strength of governance, institutional capacity, financial sustainability, community participation, and continuous performance monitoring. When supported by these enabling conditions, the technologies presented in this guidance can help ULBs establish efficient, resilient, and resource-efficient solid waste management systems that are aligned with the principles of the Circular Economy and the SWM Rules.

12. References

- Central Pollution Control Board (CPCB): 'Selection Criteria for Waste Processing Technologies', 2016
- Solid Waste Management Rules, 2016 - Ministry of Environment, Forests and Climate Change, Government of India
- Solid Waste Management Rules, 2026 - Government of India (as applicable)
- Manual on Municipal Solid Waste Management, Ministry of Urban Development, 2000
- Report of the Task Force on Waste to Energy (Vol. I), Planning Commission, May 2014
- Plastic Waste Management Rules, 2022 (Amendment) - Government of India
- AMRUT 2.0 SWM Guidelines - Ministry of Housing and Urban Affairs
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- Karnataka Municipal Administrative Service (Cadre and Recruitment) Rules, 2022 — categorised population notification, Urban Development Department, Government of Karnataka

This document has been prepared as a guidance reference for DMA Karnataka, for use in training, planning, and oversight of solid waste management in Town Municipal Councils and Town Panchayats. It should be read in conjunction with state-level SWM circulars and district-specific SWM plans.

Annexures

Table 9: Specifications for Various Waste Processing Technologies

S. No.	Technology	MSW Characteristics	C/N Ratio	pH Control	Temperature Required	Moisture Content
1	**Composting**	Sorted organic fraction of MSW, preferably with similar rates of decomposition	25–50 initially; lower ratios may lead to ammonia release and reduced biological activity	7.0–7.5 (optimum); should not exceed 8.5	50–55°C initially; 55–60°C during the remaining composting period	~55% (optimum)
2	**Incineration**	MSW with high calorific value; volatile matter >40%; fixed carbon <15%; total inert <35%	Calorific value >1200 kcal/kg	–	850–1400°C	<45%
3	**Pyrolysis**	–	–	6.5–8.5 (optimum)	700–900°C	–
4	**Gasification**	–	–	–	>1000°C	–
5	**Biomethanation**	Sorted organic fraction only; higher putrescibility improves gas yield; fibrous material is undesirable	25–30 (preferred)	Stable pH required for methanogenic bacteria; acidogenic bacteria reduce pH through acid production	Mesophilic: 37–41°C (or 20–45°C ambient); Thermophilic: 50–52°C (up to 70°C)	>50%
6	**Vermi-composting**	Organic waste that is not excessively oily, spicy, salty, acidic, alkaline, or hard	30:1 (preferred)	Slightly alkaline; can be corrected using calcium carbonate	20–30°C	40–55% (preferred)

Glossary

Biological Treatment: The treatment of biodegradable solid waste using biological processes such as composting, vermicomposting and biomethanation to stabilise organic matter and recover useful products.

Pyrolysis: A thermo-chemical process that decomposes combustible waste at high temperatures in the absence or near absence of oxygen to produce gases, oils and char.

Refuse Derived Fuel (RDF): Fuel prepared from segregated combustible fractions of municipal solid waste after removal of recyclable and inert materials, intended for use in cement kilns, industrial boilers or other approved energy recovery facilities.

Scientific Disposal: Environmentally sound disposal of residual solid waste through engineered sanitary landfills or other approved methods in accordance with the Solid Waste Management Rules after recovery of recyclable and recoverable materials

Segregation at Source: The sorting and separate storage of various components of solid waste, including biodegradeble, non-biodegradable, domestic hazardous and horticultural waste, at the point of generation.

Solid Waste Management : The collection, transportation, processing, recycling, treatment and scientific disposal of solid waste in an environmentally sound manner.

Scarp Combustible Fraction (SCF): The non-recyclable but combustible fraction of segregated dry waste that can be utilised for energy recovery through RDF production, co-processing or Waste-to-Energy facilities.

Technology Selection Matrix: A decision-support framework used to compare waste processing technologies based on waste quantity, composition, land availability, costs, operational requirements and institutional capacity.

Urban Local Body (ULB): An institution of local self-government constituted under Article 243Q of the Constitution of India, including Municipal Corporations, Municipal Councils and Town Panchayats.

Vermicomposting: A biological process in which selected species of earthworms convert biodegradable organic waste into nutrient-rich vermicompost under controlled environmental conditions.

Waste Flow Diagram (WFD): An analytical tool used to map the generation, collection, treatment, recovery and final disposal of waste within a defined geographical area to support planning and decision-making.

Waste-to-Energy (WtE): The generation of energy in the form of electricity and/or heat from combustible fractions of municipal solid waste using approved thermal treatment technologies such as incineration or gasification.

Wet Waste: Biodegradable waste comprising food waste, vegetable and fruit waste, garden waste and other organic materials that are suitable for biological treatment.


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