



# PROCESSING AND TREATMENT OF VARIOUS WASTE STREAMS

## CONTENT

# TRAINING MODULE ON PROCESSING AND TREATMENT OF VARIOUS WASTE STREAMS

1. Wet waste management
2. Dry waste management
3. Managing Sanitary Waste
4. Managing Household Hazardous Waste

# PROCESSING AND TREATMENT OF WET WASTE

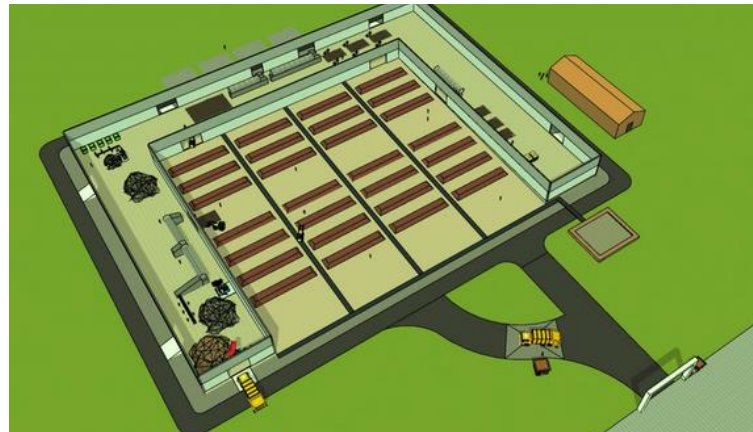
## CONTENT

1. Overview of wet waste management technology
2. Types of wet waste processing technologies
3. Basic Machinery required for Class A, B & C cities
4. Other wet waste management technology
5. Selection of the appropriate technology

# PROCESSING AND TREATMENT OF WET WASTE

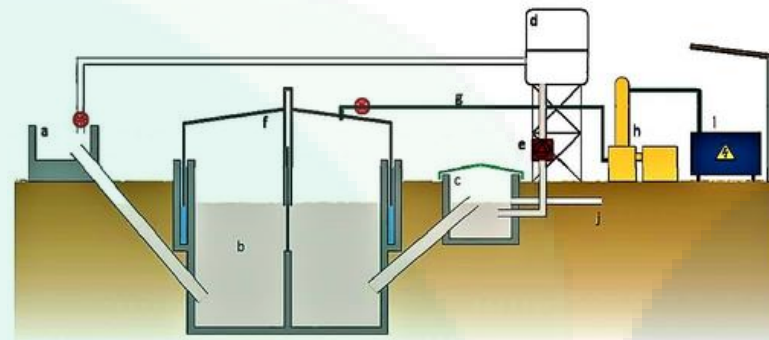
# TYPES OF WET WASTE PROCESSING TECHNOLOGIES

Waste is a valuable resource and can be processed to useful compost or energy.



## Aerobic

- In presence of free oxygen
- Is a faster process compared to other



## Anaerobic

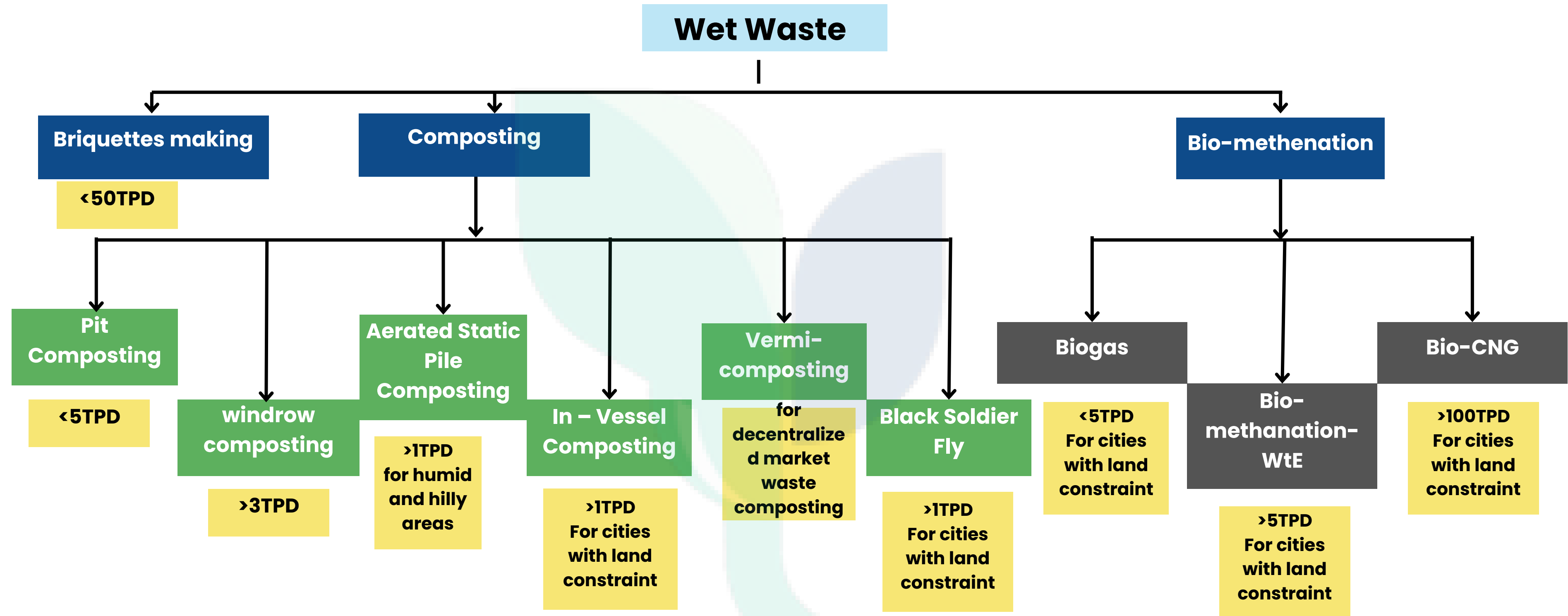
- In the absence of free oxygen
- Biomethanation is a anaerobic process generating gas



## Other

- Briquette making
- Garden waste

# OVERVIEW OF WET WASTE MANAGEMENT TECHNOLOGY



# 1. AEROBIC – WINDROW COMPOSTING



- Open-air decomposition takes 28 to 35 days
- Aerobic microorganisms convert organic compounds to CO<sub>2</sub> and nitrogen oxides
- Carbon serves as an energy source, while nitrogen is recycled
- Windrows are formed into a proper shape and size which helps to maintain aeration in the windrow.
- Windrows are weekly monitored for appropriate decomposition which ensures that the process is completed within the 35 to 40 days cycle and backlog of waste is avoided.
- Decomposed material is then harvested and processed to convert into compost. Compost is either pre-cured or post-cured depending on the process of composting used.



<b>Basic Principle</b>	Degradation by aerobic microorganism
<b>Qty of waste</b>	5MT – 500MT
<b>Segregation level required</b>	High for good quality compost as per FCO norms
<b>Resource recovery</b>	Compost – 15 – 30% by weight of waste
<b>Cost</b>	Low to high

## 2. AEROBIC – PIT COMPOSTING

- Waste processed in pits made of bricks, plastic, concrete, or other materials
- Pits have side punctures for aeration and bottom channels for leachate drainage
- Waste turned periodically within the pit
- Suitable for small to medium urban bodies
- Decomposed material is then harvested and processed to convert into compost.
- Compost is either pre curated or post curated depending on the process of composting used.



**Cross Section of Typical Pit Composting Facility**

<b>Basic Principle</b>	Degradation by aerobic microorganism
<b>Qty of waste</b>	0.5MT – 5MT
<b>Segregation level required</b>	High for good quality compost as per FCO norms
<b>Resource recovery</b>	Compost – 15 – 30% by weight of waste
<b>Cost</b>	Low to medium

### 3. AEROBIC – VERMICOMPOSTING

- Organic waste treated by earthworms
- Natural, odorless, aerobic process
- Worms feed on organic matter, produce worm castings
- Earthworms' digestive system transforms waste into fertilizer



<b>Basic Principle</b>	Degradation by earthworms
<b>Qty of waste</b>	0.5MT – 2 MT
<b>Segregation level required</b>	High for good quality compost
<b>Resource recovery</b>	Compost – 15 - 30% by weight of waste
<b>Cost</b>	Low to medium

## 4. AEROBIC – AERATED STATIC PILE COMPOSTING

- Forced aeration used in aerated static pile composting
- Compost piles placed over pipes connected to blower for air supply
- Air supplied under positive or negative pressure
- As the aerated static pile does not receive periodic turnings, the selection and initial mixing of raw materials is critical to avoid poor air distribution and uneven composting.
- When the composting process is nearly complete, the piles are broken up for the first time since their construction.
- Compost undergoes post-processing steps



<b>Basic Principle</b>	Degradation by aerobic microorganism with forced aeration
<b>Qty of waste</b>	100 MT – 500 MT
<b>Segregation level required</b>	High for good quality compost
<b>Resource recovery</b>	Compost – 15 – 30% by weight of waste
<b>Cost</b>	Medium to High

## 5. AEROBIC – IN-VESSEL/ MECHANICAL COMPOSTING

- In this systems enclose the feedstock in a chamber or vessel that provides adequate mixing, aeration, and moisture.
- There are several types of in-vessel systems available: drums, silos, digester bins, and tunnels.
- These vessels can be single or multi-compartment units.
- In some cases, the vessel rotates; in others, the vessel is stationary and a mixing or agitating mechanism moves the material around.
- Detention time varies from 3–10 days & curing period 2–3 weeks is required after the active composting period.
- A major advantage of in-vessel systems is that all environmental conditions can be carefully controlled to allow rapid composting.



<b>Basic Principle</b>	Degradation by mechanical actions
<b>Qty of waste</b>	100kgs – 2 MT
<b>Segregation level required</b>	Medium to high
<b>Resource recovery</b>	Compost – 15 - 30% by weight of waste
<b>Cost</b>	Low to Medium

## 6. AEROBIC – BLACK SOLDIER FLY

- **Feed:** various types of organic matter, including food waste, and reduce the weight of the waste by about 50%
- BSF consume organic waste up to 4 times their body weight a day.
- **Advantages:** It requires less land space, and resources, and the compost created by the BSF can be harvested in less than three weeks,
- **By product:** Part of the larvae are used to repopulate the colony while the rest is used as a feed for livestock as they make a great protein feed for chicken and fish.
- BSF-based technology does not produce any greenhouse gases.
- **Limitations:**
  - Moisture content 70% to 80%
  - a specific particle size (1-2 cm)
  - no hazardous materials and no inorganic substances.



<b>Basic Principle</b>	Insect Based Bioconversion
<b>Qty of waste</b>	1 MT – 50 MT
<b>Segregation level required</b>	Medium
<b>Resource recovery</b>	Compost – 15 – 20% by wt of waste
<b>Cost</b>	Medium to High

# EIGHT STEPS OF COMPOSTING

## 1.INPUT WASTE

unloading of wet waste on waste receiving platform



## 2.PRESORTING OF WASTE

Presorting can be done manually or by using trommel and conveyor system. Its an important step to ensure quality of wet waste



## 3.PREPROCESSING

It includes shredding and squeezing of wet waste to extract moisture content of wet waste and mixing dry leaves, cocopeat etc



## 4.FORMATION OF PITS /WINDORWS

Pit composting for >5 TPD Wet waste  
Windrow composting >3 TPD wet waste



## 5.HARVEST

1. Take out the compost from the windrow/pit and transfer to screening area.  
2. Take care to demarcate each batch separately.  
3. Pass the harvested compost through a 35mm, and then 16 mm trommel. Or a stationary sieve of 16 mm.



## 6.CURING OF COMPOST

1. Store the screened compost by forming piles under a shed and let it rest for minimum 7 Days.  
2. Pass the compost through 4mm sieve/trommel. This will ensure a uniform size



## 7.QUALITY CHECK

The compost has to meet the compliance requirements of the FCO 2013 Norms. After curing Physical Parameters, Chemical Composition and Presence of Heavy Metals should be checked to ensure quality of compost



## 8.PACKING AND STORAGE

Packed Compost to be stored in a dry and enclosed facility with ventilation. The Compost should to be branded under a trusted creditworthy brand.

# COMPOST QUALITY - IMPORTANCE



- Good quality compost provides the nutrients to the soil, that are transferred to the crops



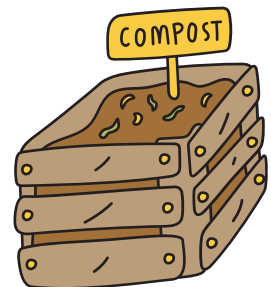
- Bad quality compost can cause chemical contamination of the soil.

- Nutrient deficient compost may not harm plants but will add no value



- Compost with heavy metals is detrimental to crop health, yield and eventually human beings.

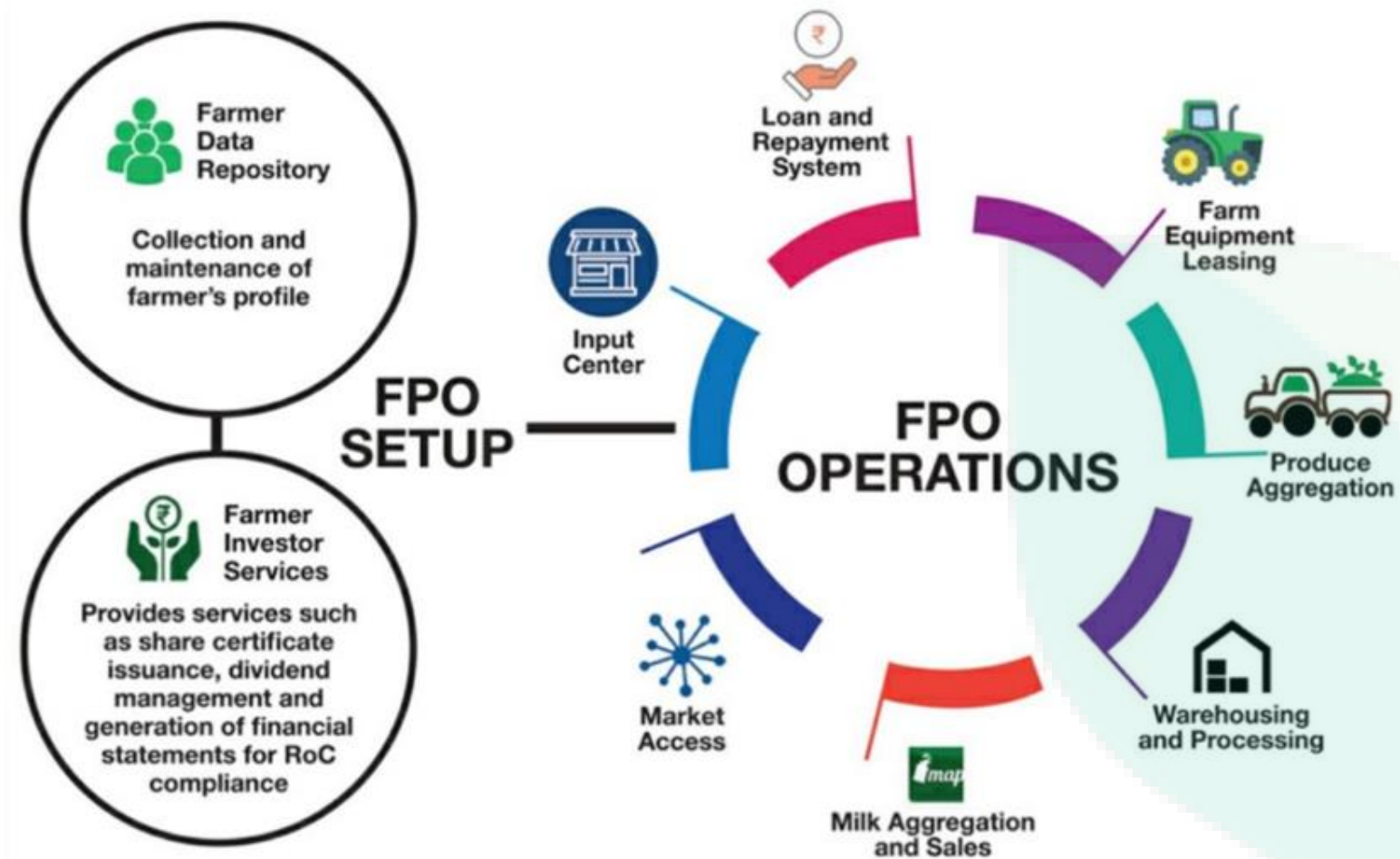
- The compost which is to be used as soil conditioner for food crops should abide by the more stringent FCO, 2009 norms



- Whereas compost used for floriculture or ornamental plants can abide by SWM Rules 2016.



# MARKET LINKAGES



## A. Local Buyers

1. Citizens, local nurseries, farmers and others are interested in compost
2. Create awareness about the availability of city compost.
3. Set up dedicated shops, locations or private partner channels where city compost is readily available, sold regularly and at a fixed rate

## B. Farmer Producer Organization (FPO):

ULB shall identify FPO in their vicinity and form direct tie-ups for marketing and promotion of compost.

## C. Direct to fertilizer companies

Approach fertilizer companies to sell the compost. Such as Rashtriya Chemical Fertilizer (RCF). There are private fertilizer companies too. Enter a contract, either directly or if operation of the plant is given to a contractor, through them with the fertilizer company.

## Potential for use of City Compost

The cultivated area (17.43 million ha) is about 80% of the total geographical area.

The irrigated area is about 17% (2.94 million ha).

Current practice is anyway sub optimal use of about 5 tons/ha /year on an average (this is the reasonable demand rate)

# BASIC MACHINERY REQUIRED FOR CLASS A,B & C CITIES



**Shredder-5HP,7.5 HP, 10HP**



**Squeezer for Wet Waste**



**Windrow turner**



**Compost seive**



# OTHER SPECIFIC MACHINERY



**Trommels**



**Ballistic Separator**



**Conveyor belts**



**Air Compressor**



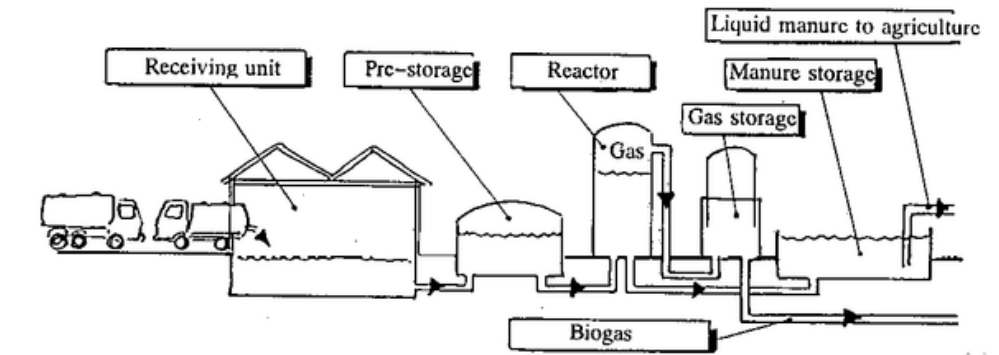
**Dust Control System**



**Overhead Magnetic Ferrous Metal Separator**

# 7.ANAEROBIC – BIOMETHANATION

- Biomethanation: Fermentation of biodegradable matter in controlled conditions
- Waste decomposition: Microbial activity breaks down waste into biogas and digested sludge
- Suitable waste types: Hotel, market, slaughterhouse, agriculture market waste
- Costly process: Requires investment, but less time and land
- Energy generation: Biogas can be used for cooking, electricity, and heat production
- **Limitations:**
  - Suitable for temp > 20°C
  - High operational cost, need skilled labour

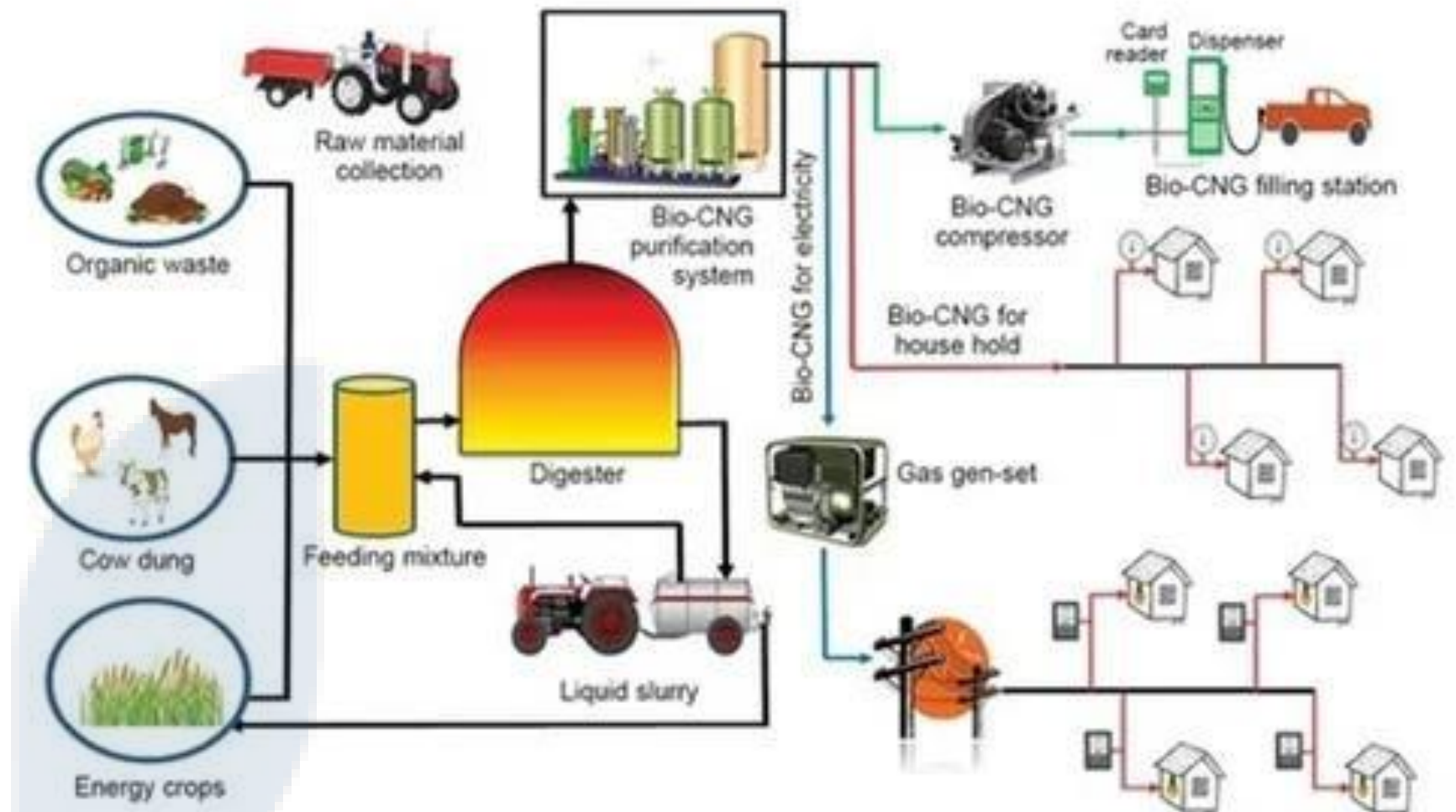


Segregated organic waste free from inert and toxic material is a prerequisite for biomethanation

<b>Basic Principle</b>	Fermentation in an enclosed space under controlled conditions.
<b>Qty of waste</b>	50 Kg – 50 MT
<b>Segregation level required</b>	High
<b>Resource recovery</b>	Gas for cooking or electricity
<b>Cost</b>	High

## 8. ANAEROBIC – BIO CNG

- Biogas can be cleaned by removing CO<sub>2</sub> and H<sub>2</sub>S
- Compressed Natural Gas (CNG): Methane-enriched biogas (>90% CH<sub>4</sub>)
- Compressed Biogas (CBG): Similar properties to CNG, renewable automotive fuel
- State and Govt. schemes: Promote plant setup
- CPCB guidelines: For CNG plants (agricultural sector)
- **Limitation:** suitable for > 100 TPD wet waste
  - High capital and operational cost



<b>Basic Principle</b>	Fermentation in an enclosed space under controlled conditions, and cleaning of gases generated..
<b>Qty of waste</b>	100 ton – 500 MT
<b>Segregation level required</b>	High
<b>Resource recovery</b>	Compressed Bio Gas and Fermented Organic manure
<b>Cost</b>	High

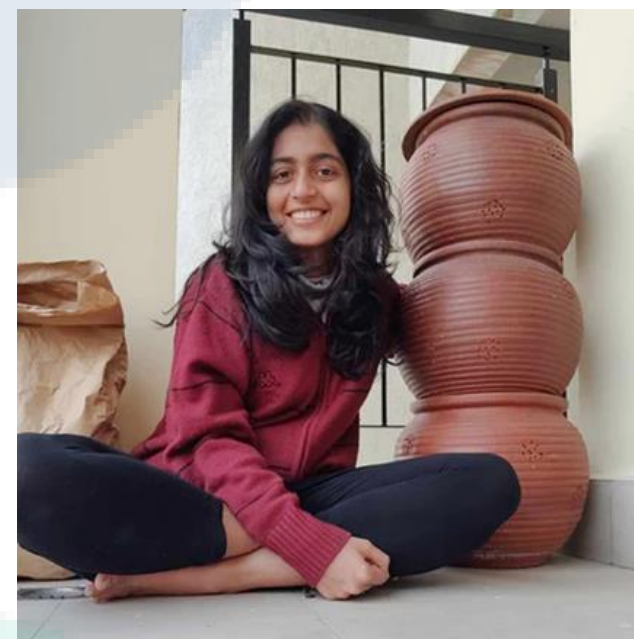
## 9. OTHER - GARDEN WASTE PROCESSING

- Garden waste consists of grass, leaves, and tree and bush trimmings.
- Composted at the site or at a decentralized facility is the best option.
- Barrel or drum composter can be used for composting to save space and hasten decomposition. Bins made of wire, wood, or even garbage cans with drainage holes can be used for the purpose. It should be ensured that the bins are rodent resistant and have a secure cover.
- Shredding will shorten composting time.
- The output biomass has high market value as fuel, cocopeat for plants and fiber for coir products.

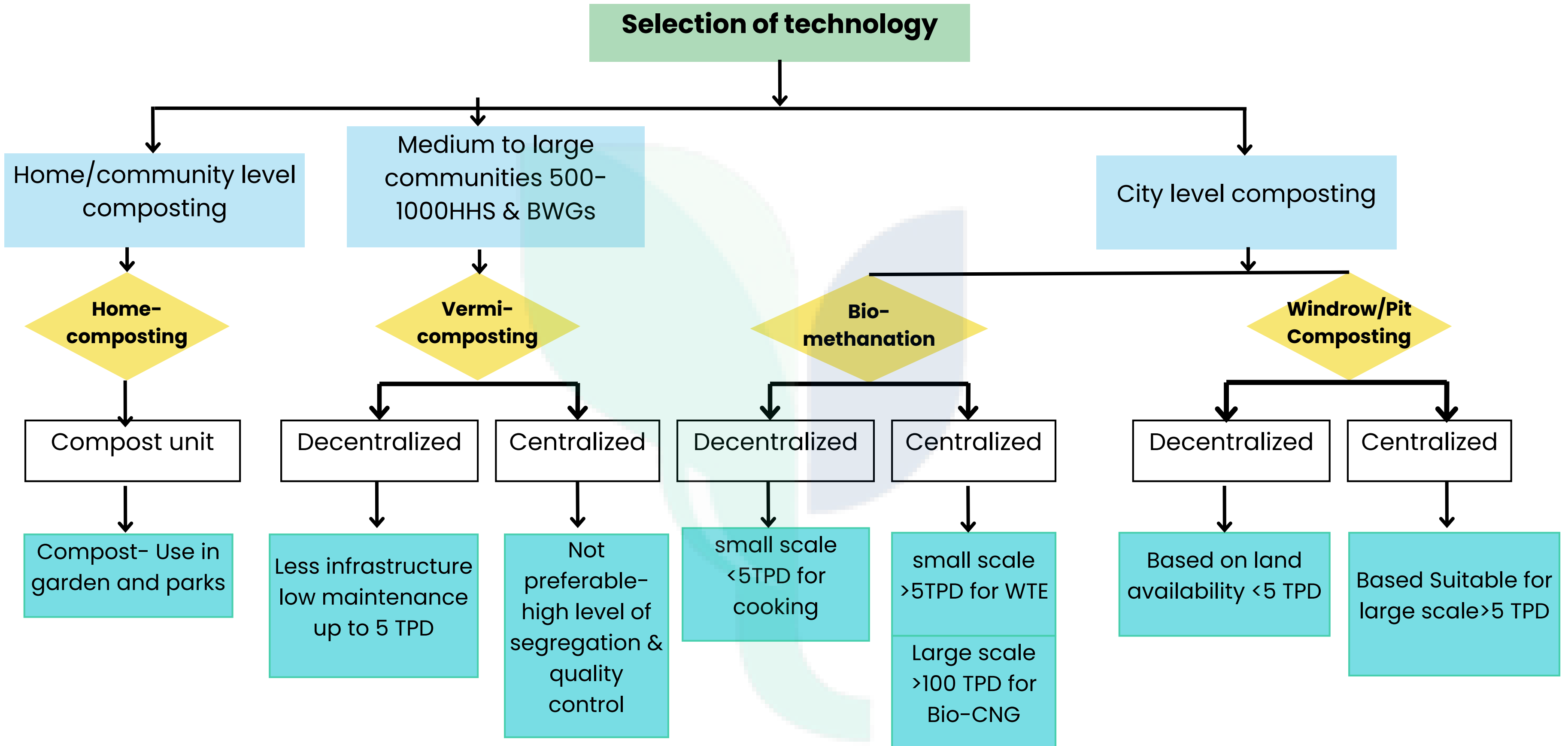


## 10. DECENTRALISED COMPOSTING-HOME COMPOSTING

- Composting at home, for small quantity of waste is easier. The waste is well segregated.
- Creating a pit if space is available is the easiest of the solutions.
- There are several available bins or containers available for homecomposting for citizens
- Microculture is also easily available in the market
- Household Biogas units are also safe and convenient for use.
- ULBs have to create awareness and empanel agencies which provide such services and are valid.



# SELECTION OF THE APPROPRIATE TECHNOLOGY



# COMPARATIVES OF THE TECHNOLOGIES

Parameter	Windrow Composting	Pit Composting	Aerated Static Pile Composting	In – Vessel Composting/ rotary drum composting	Vermicomposting	Black Soldier Fly	Biogas	Briquettes
<b>General</b>	suitable for >3-5 TPD	Small scale < 5 TPD	for humid and hilly areas	Large scale systems for commercial applications	for market waste-decentralised waste management	Innovative Technology-Medium scale,	for Market and hotel waste	waste to energy Plant
<b>Land Requirement</b>	1TPD-350 sq.m to 8 ha for 500 TPD including buffer zone	1 ton-150 sq.m to 5 TPD-750sq.m	1TPD-150 sq.m to 5 Ha for 500 TPD	1TPD-150sq.m 4 ha for 500 TPD ( Limited land due to rapid rates)	1TPD-150 sq.m to 2 ha for 50 TPD	280 sq.m for 1TPD to 1.4 ha for 50 TPD	For 1 tpd 200 sq.m to 0.6 Ha for 50 TPD	for 100 Tons 0.4 Ha
<b>Time</b>	8 weeks	8 weeks	5 weeks	4 weeks (3-5 days in vessel, 3 weeks to mature)	8 – 10 weeks	8 weeks	1 day	4 weeks
<b>Amount of input waste per day to be treated</b>	1 to 500 tonnes	1 to 5 tonnes	1 to 500 tonnes	1 to 300 tonnes	1 to 50 tonnes	1 to 50 tonnes	1 to 5 TPD- Biogas>5 TPD WTE>100 TPD Bio-CNG	70 tonnes or more
<b>Energy Input</b>	low	low	Moderate	High	Low	Moderate	Moderate	High
<b>Financial implications</b>	low	low	Costly	Very Costly	Moderate but purchase of exotic earthworms suitable for MSW vermicomposting are expensive.	Slightly costly, Need for enclosed greenhouse shed, and labs	Costly	Costly – If natural drying is used, land requirements will increase.



# **DRY WASTE MANAGEMENT**

# DRY WASTE MANAGEMENT

## CONTENT

- 1. Flow of Dry waste**
- 2. Type of MRF**
- 3. Dry Waste Value chain**
- 4. Pre-sorting and Material Handling equipment's**
- 5. Requirement for MRF**
- 6. Type of dry waste and recycling potential**
- 7. Requirement of MRF Facility as per the scale of city:**

# FLOW OF DRY WASTE



## Segregated Dry Waste

- The wet waste component has to be separated, for material recovery

## Material Recovery Facility

- Removal of recyclables

## Waste to Energy – Incinerator/ RDF

- The remaining dry waste, to be send as RDF to nearest Cement factory or WtoE plant in the vicinity

## Landfill – Inerts

- Incinerator or Waste to Energy plants require at least 500MT or more of waste.
- WtE use technologies of Gasification or Pyrolysis to generate electricity.
- Landfills should receive only 10 to 15% of remaining waste.

# TYPES OF MRF

Depending on the scale of operations and the level of mechanization



## Manual

Usually small-scale units, manual MRFs largely employ manual sorting practices and are typically owned, managed, and operated by the informal sector.

- Material is segregated based on the types of waste.

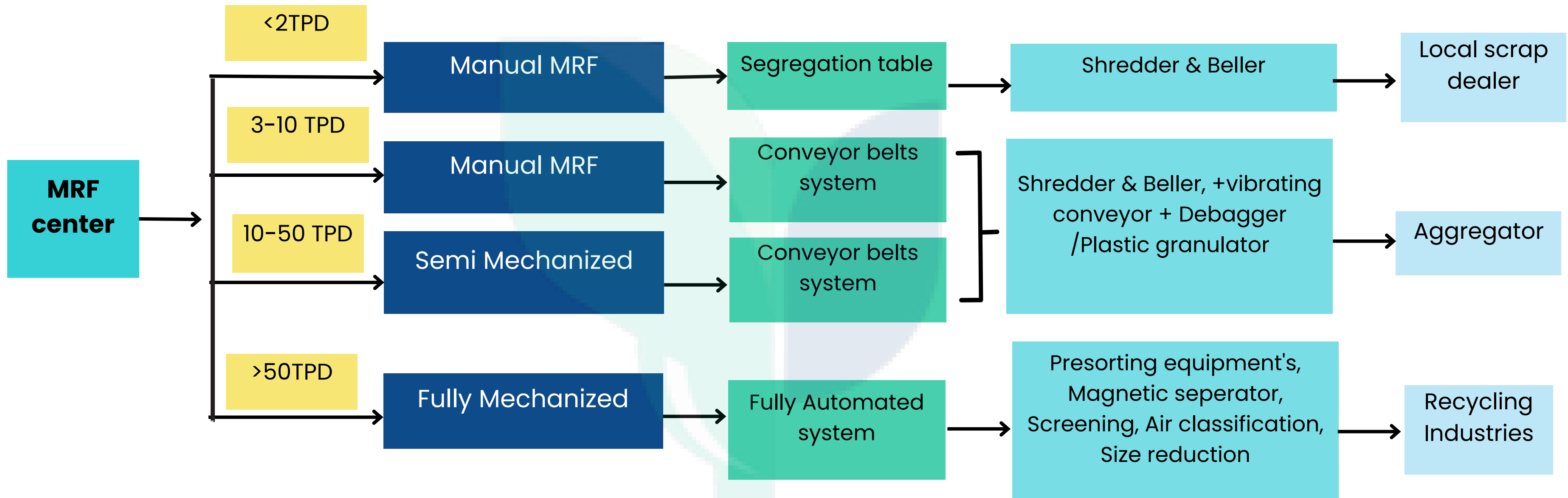


## Mechanized

Mechanized MRFs are large facilities with sophisticated systems and equipment that enable the efficient separation of large quantities of material into

- different fractions

# DRY WASTE VALUE CHAIN



# TYPES OF MRF

Different Processes or Stages and Equipment Employed in a Material Recovery Facility

## For Corporation

Pre-sorting material handling	Equipment	Ferrous metal separation	Screening	Air classification	
<ul style="list-style-type: none"> <li>- Belt conveyor</li> </ul>	<ul style="list-style-type: none"> <li>- Screw conveyor</li> <li>- Apron conveyor</li> <li>- Bucket elevator</li> <li>- Drag conveyor</li> <li>- Pneumatic conveyor</li> <li>- Vibrating conveyor</li> <li>- Debagger</li> </ul>	Magnetic separator and screening	<ul style="list-style-type: none"> <li>- Disc Screening</li> <li>- Trommels</li> </ul>	<ul style="list-style-type: none"> <li>- Horizontal air classifier</li> <li>- Vibrating inclined air classifier</li> <li>- Inclined air classifier</li> </ul>	
		Non-ferrous metal separation	Size reduction	Pollution control	Other: fixed equipment
		<ul style="list-style-type: none"> <li>- Rotating disk separator</li> <li>- Eddy current separator</li> </ul>	<ul style="list-style-type: none"> <li>- Can densifier</li> <li>- Can flattener</li> <li>- Glass crusher</li> <li>- Plastic granulator</li> <li>- Plastic perforator</li> <li>- Baler</li> </ul>	<ul style="list-style-type: none"> <li>- Dust collection system</li> <li>- Noise suppression devices</li> <li>- Odour control system</li> <li>- Heating ventilating and air conditioning (hvac)</li> </ul>	<ul style="list-style-type: none"> <li>- Fixed storage bin</li> <li>- Live-bottom storage bin</li> <li>Floor scale for pallet or binloads</li> <li>Truck scale</li> <li>Belt Scale</li> </ul>

# TYPES OF MRF

Different Processes or Stages and Equipment Employed in a Material Recovery Facility

For ULB > 1 Lakh			
Pre-sorting material handling	Size reduction	Pollution control	Other: fixed equipment
<ul style="list-style-type: none"> <li>- Belt conveyor</li> <li>- Screw conveyor</li> <li>- Vibrating conveyor</li> <li>- Debagger</li> </ul>	<ul style="list-style-type: none"> <li>- Plastic granulator</li> <li>- Baler</li> </ul>	<ul style="list-style-type: none"> <li>- Ventilators</li> </ul>	<ul style="list-style-type: none"> <li>Storage bins</li> <li>Weighing machines</li> </ul>
For ULB < 1 Lakh			
Pre-sorting material handling	Size reduction	Pollution control	Other: fixed equipment
<ul style="list-style-type: none"> <li>- Belt conveyor /Screw conveyor</li> </ul>	<ul style="list-style-type: none"> <li>- Baler</li> </ul>	<ul style="list-style-type: none"> <li>- Ventilators</li> </ul>	<ul style="list-style-type: none"> <li>Storage bins</li> <li>Weighing machines</li> </ul>

# REQUIREMENT FOR MRF



Waste receiving Platform



Platform for secondary segregation of dry waste



Balling of recyclable plastic, paper, cardboard etc



Storage compartments for dry waste

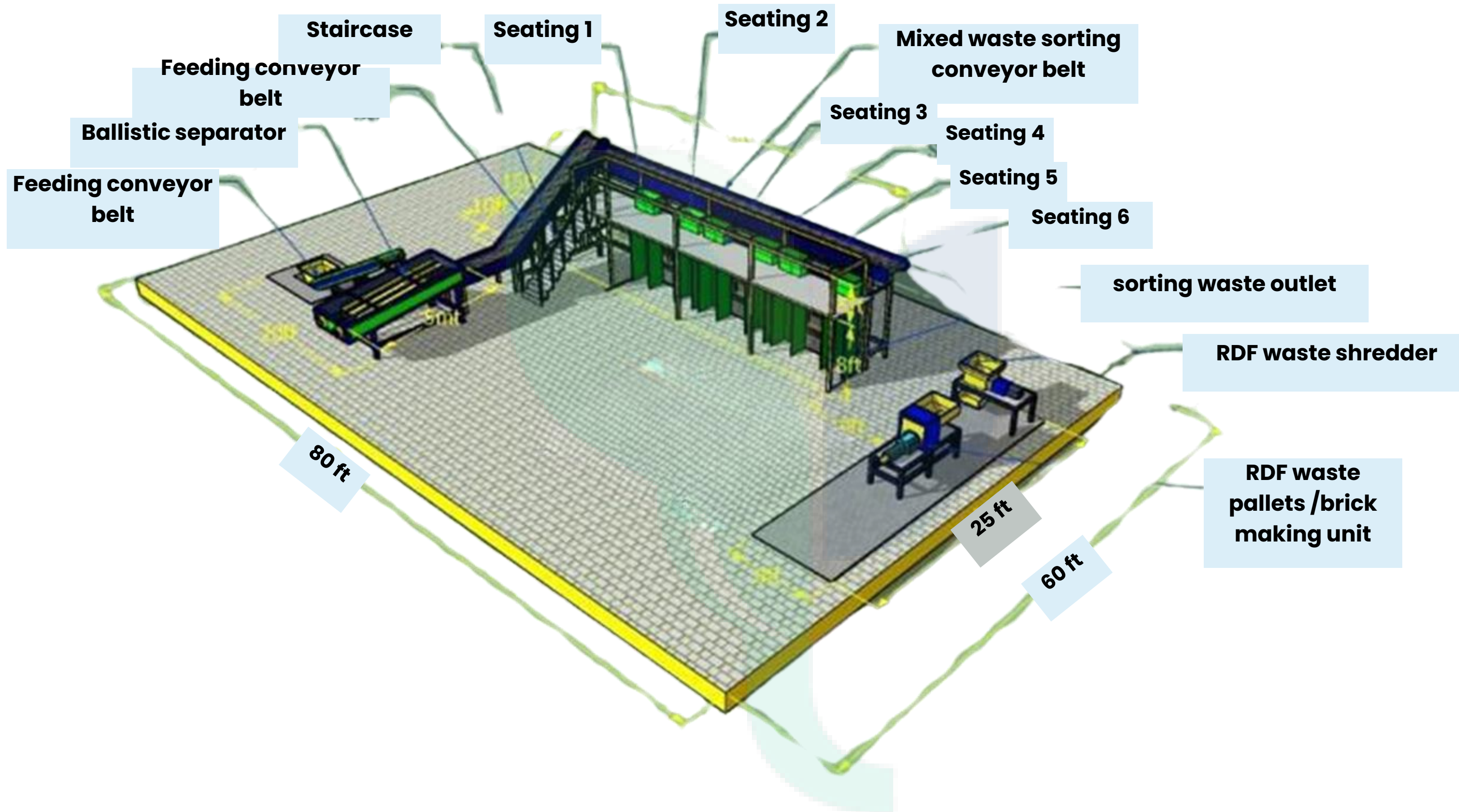


Weighing scale

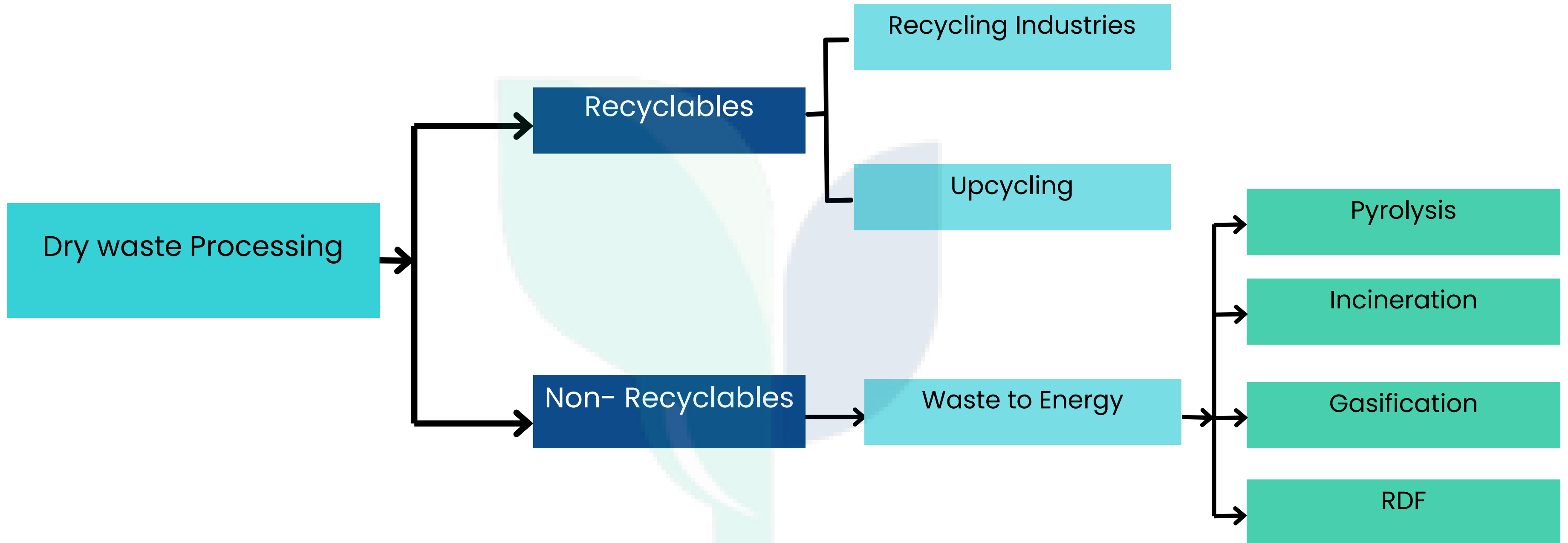


PPE

# REQUIREMENT FOR MRF > 1 LAC POPULATION (LAYOUT)



# DRY WASTE PROCESSING



# TYPE OF DRY WASTE AND RECYCLING POTENTIAL

## Plastic Waste



### Recycled into

New bottles, Fleece & Carpets



### Recycled into

Bottles, pens & Plastic lumber



### Recycled into

Footwear, Mats, Hoses & Traffic cones



### Recycled into

Plastic bags, Films, & Trashbags



### Recycled into

Industrial material, kitchen wear & clothing fibre



### Recycled into

Packaging, Insulation & Toys



### Recycled into

Outdoor signs, plastic lumber & Automotive parts

# TYPE OF DRY WASTE AND RECYCLING POTENTIAL

## Paper & Cardboard Waste



### Converted into:

New Paper, Handmade paper, Upcycled paper bags & stationery products

Eg: Collect & recycle, Scrap man, greenotechindia

## Cloths



### Converted into:

Reused, Refurbished, & Upcycle.

Eg: Sadguru parivar, Ecoregain, reCharkha

## Metal/wood



### Converted into:

- Scrap metal has a high market value
- It can be recycled indefinitely

Eg: Reliable Metal Refinery, MUDABBIR FURNITURE AND SCRAP CENTER.

Local aggregator from the area.

# TYPE OF DRY WASTE AND RECYCLING POTENTIAL

## E-waste



### Dismantled into:

Plastic, metal, paper, rubber, glass, electronic boards, and any other material as per composition.

Eg: Evergreen Recyclekaro India Pvt. Ltd.,

Eg: Evergreen Recyclekaro India Pvt. Ltd.,  
Mahalaxmi E Recyclers Pvt. Ltd.  
Kuldeep E-Waste Disposals – E Waste Buyer Pune

## Glass



### Converted into:

- It has a moderate market value.
- It can be melted and sorted into colors.
- Recycling glass save virgin a material

Eg: Swach, Greensutra.

Local aggregator from the area.

# FORWARD LINKAGES

- Developing appropriate recycling forward linkages is critical to ensure environmentally safe recycling and reuse of the resources.
- Revenue earning potential can also be harnessed based on forward linkages
- The rates will vary based on distance to major recycling centers and quantities.
- ULBs should make provisions for storage of waste till at least a Ton of the material is ready for transfer.
- Keeping a record of quantities of each type of waste generated, can help in future EPR credits
- ULB should register as a Waste processor under EPR portal of MOEF.

## **MH State Govt, Forward linkages Drive link:**

<https://drive.google.com/drive/folders/1WEBaSGg4FD6-ZqXWtdD9CC75JirTWfev?usp=sharing>



# **MANAGING SANITARY WASTE & HHW**

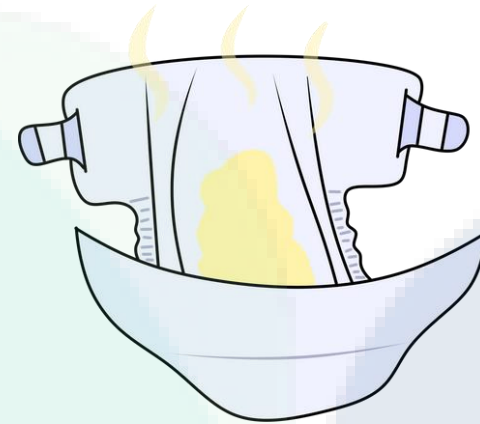
# SANITARY WASTE

**“Sanitary waste” means wastes comprising of used diapers, sanitary towels or napkins, tampons, condoms, incontinence sheets and any other similar waste**



## Menstruation Waste

Used Sanitary pads/ napkins, tampons, etc. This forms a larger part of the sanitary waste.



## Sanitary Convenience Waste

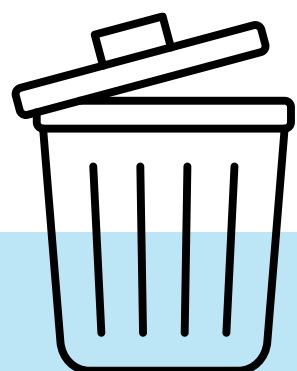
Waste that contains human feces, urine, blood or body fluids originating from sanitary conveniences or other sources.



## Biomedical Waste

Cottons, tissue papers containing body fluid

# SANITARY WASTE PRACTICES



**45%**  
Use routine  
waste  
disposal  
methods or  
dustbin



**23%**  
Throwaway in  
open spaces,  
drains, rivers,  
wells, lakes or  
roadside



**15%**  
Dispose of by  
burning



**25%**  
Dispose of by  
burying



**9%**  
throw in  
toilets  
(flushing or  
pit latrine)

# TRANSPORTATION OF SANITARY WASTE



<p><b>Specialized Containers:</b></p>	<ul style="list-style-type: none"> <li>• Use leak-proof, puncture-resistant, and tamper-evident containers lined with plastic bags</li> </ul>
<p><b>Segregation and Labeling:</b></p>	<ul style="list-style-type: none"> <li>• Segregate sanitary waste at the source and label containers clearly.</li> </ul>
<p><b>Transporters:</b></p>	<ul style="list-style-type: none"> <li>• Vehicles to have a separate bin/ bag to collect sanitary waste and transport it.</li> </ul>
<p><b>Documentation:</b></p>	<ul style="list-style-type: none"> <li>• Maintain records of pickups, quantity collected, and relevant details for compliance and auditing</li> </ul>
<p><b>Disposal at Approved Facilities:</b></p>	<ul style="list-style-type: none"> <li>• Dispose of waste at authorized facilities, such as sanitary landfills or treatment plants</li> </ul>
<p><b>Employee Training:</b></p>	<ul style="list-style-type: none"> <li>• Train staff on proper handling, safety measures, and regulatory compliance.</li> </ul>
<p><b>Community Awareness:</b></p>	<ul style="list-style-type: none"> <li>• Educate the community on using designated containers and following disposal guidelines.</li> </ul>

# TECHNIQUE OF DISPOSAL IN ULB'S & INSTITUTIONAL BODY FOR SANITARY WASTE

Disposal option	Type of use	Advantages	Disadvantages	Example of Use
<b>Electric Smokeless incinerators</b>	Institutional/public settings, centralized processing system	More hygienic, Some models have emission control	Dependent on electric supply, High cost (3 units/cycle) (approx. 24 units/day for 100kg waste)	Public toilet, Chennai, Central Railway Station
<b>Locally-made incinerators</b>	Small Scale institutional/public settings	Low cost, Easy to install	No emission controls, Burns at low temperature, hence waste may not burn efficiently, Design is highly variable and not standardized	Mandatory for Institutions under SBM
<b>Padcare Solutions</b>	Institutional/public settings	Environmental Friendly Solution Segregate Pulp & plastic	Due to Start-up So limited Source	Mumbai, Bengaluru, Mahabaleshwar, Hyderabad, and Gurugram

**padcare**

World's first smokeless and eco-friendly system which converts used pads into sterilized and segregates cellulose and plastic.

**THE IMPACT**  
against 1000 women

- Capacity of treating 950 pads/day
- Patent Pending Technology
- Tested and certified as per government norms
- Reusable output

**7800** Pads diverted to make recyclable products

**2.2MT** Carbon saved per month

**85%** Reduction in infections caused by high bacterial load

**SDG's**  
SDG 3 Good health  
SDG 6 Sanitation  
SDG 11 Sustainable cities



# SWACH RED DOT CAMPAIGN : IMPACT AND FUTURE INITIATIVES



## Waste Collection Statistics

- Waste pickers segregate 20 tonnes (roughly 20,000 kg) of sanitary waste daily.



## Campaign Concept

- Promotes responsible disposal practices to protect waste workers' dignity and health.
- Encourages households to segregate and mark sanitary waste with a visible red dot



## Merchandise for Advocacy

- SWaCH sells disposable bags/papers made by aged waste workers for easy wrapping.
- Priced at Rs 1.25, promoting sustainable practices with minimal profit.



## Waste-to-Energy Plant

- Segregated sanitary waste is sent to a waste-to-energy plant for proper treatment.



# **MANAGING HOUSEHOLD HAZARDOUS WASTE**

# HOUSEHOLD HAZARDOUS WASTE

- **End-of-life household items labeled as flammable, toxic, corrosive, or reactive,** containing substances like lead, mercury, arsenic, cadmium, PVC, and acids, are termed as Household Hazardous waste
- These are frequently disposed of with general municipal waste. This poses a significant risk for the health of waste workers.
- Improper collection, including mixed waste dumping, can severely impact groundwater and surface water quality and cause irreversible damage to the environment and public health.



# POLLUTANTS OF CONCERN IN HOUSEHOLD PRODUCTS

Lead



## HOUSEHOLD CLEANERS

Oven cleaners, drain cleaners, wood and metal cleaners and polishes, toilet cleaners, tile and shower cleaners, bleach (laundry)



## AUTOMOTIVE PRODUCTS

Motor oil, fuel additives, air conditioning refrigerants, starter fluids, automotive batteries, transmission and brake fluid antifreeze



## HOUSEHOLD INSECTICIDES

Herbicides, insecticides, fungicides/wood preservatives



## MISCELLANEOUS

Mercury thermostats or thermometers, fluorescent light bulbs, discarded PVC toys, batteries, computer components and end-of-life electronics items

Cadmium



## PAINTING SUPPLIES

Adhesives and glues, furniture strippers, oil or enamel-based paint, latex or water-based paint, stains and finishes, paint thinners and turpentine, paint strippers and removers, fixatives and other solvents



## INDOOR PESTICIDES

Ant sprays and baits, cockroach sprays and baits, flea repellents and shampoos, bug sprays, houseplant insecticides, mosquito coils, moth repellents, pet care products, pet food items



## OTHER FLAMMABLE PRODUCTS

Compressed gas cylinders, kerosene diesel fuel gas/oil mix, lighter fluids, shoe polish, cigarette butts

Arsenic & Zinc

Mercury

Other Hazardous Chemicals

NOTE: The list may also contain anything that comes under the category of corrosive, ignitable, reactive, toxic, carcinogenic, or causes any short-term or long-term harm to the human health and environment.

# REGULATORY FRAMEWORK MANAGING DOMESTIC HAZARDOUS WASTE



**Segregation Mandate:**



**Storage and Collection Practices:**



**Establishment of Waste Deposition Centers:**

# TREATMENT AND DISPOSAL

## Secured landfill Disposal – Deep Burial

DHW has to be buried securely in a deep compartment, through which the chemicals will not leak. Design resembles sanitary landfills, but secured landfills have double protective layers (primary and secondary leachate collection, and double liner system). It has to be as per Pollution Control Board guidelines and permissions.

Scientific treatment and disposal of domestic hazardous waste should comply with **Hazardous and Other Wastes (M&T) Rules, 2016**.

**Central Pollution Control Board (CPCB)** guidelines set standards for land disposal, thermal disposal by incineration, and co-processing plants.



## Thermal Processing – Incineration

The State Pollution Control Board is responsible for setting up a Hazardous waste processing facility. ULBs should transport the hazardous waste to the nearest facility identified by the State Pollution Control Board.

<https://mpcb.gov.in/waste-management/hazardous-waste>