Material Recovery Facilities

What is a Material Recovery Facility (MRF)

A facility where non – compostable solid waste can be temporarily stored by local body or any other entity authorized by them to facilitate segregation, sorting & recovery of recyclables from various components of waste by authorized informal sector of waste before it is channelized for processing / disposal.

MRF facilities are required to be constructed within Panchayats / ULBs with aim to reduce the amount of waste being finally disposed and maximizing resource recovery & efficiency.

Relevant Provisions under SWM Rules, 2016

Rule 15 (h) of SWM Rules, 2016 provides that it is the duty and responsibility of local authorities and village Panchayats of census towns and Urban agglomerations to set up Material Recovery Facilities or secondary storage facilities with sufficient space for sorting of recyclable material. This will provide easy access to waste pickers and waste recyclers for collection of segregated recyclable waste such as paper, plastic, metal, glass, textile from the source of generation or from Material Recovery Facilities. Bins for storage of biodegradable waste shall be painted green, those for storage of recyclable wastes shall be painted white and those for storage of other waste shall be painted black".

Types of Material Recovery Facilities:

A. Classification based on waste received.

1. **Mixed MRF: Mixed** / unsegregated waste is segregated manually or mechanically to separate recyclable material from compostable and inert waste.

2. **Dry / Clean MRF**: Source segregated or co-mingled recyclable materials consisting of a combination of paper, cardboard, magazine, plastics, glass, metal etc. are received in dry MRF. It can recycle more materials than mixed MRF.

B. Classification based on scale of operation/ types of operation / level of mechanization.

1. **Manual MRF**: Manual sorting is carried out, suitable for handling small quantities of Solid waste, i.e., 5-10 TPD only.

   These are also known as Solid Liquid Resource Management Centers (SLRM), receive waste either in mixed form or segregated. Wet Waste processing can also be carried out in an SLRM Centre.

2. Semi-automatic MRF: Semi-automatic MRFs have a combination of manual and mechanized operations; can handle up to 100 TPD of segregated waste. Such MRFs

also serve as Secondary collection points. Wet & dry waste after segregation is transported in compacted manner.

3. Mechanical / Automated MRF: These are fully mechanized / automated facilities for handling>100 TPD of waste with least human intervention. Suitable for handling of waste that has been properly segregated at source.

Constituents of MRF:

MRF is situated within a warehouse-type building with concrete flooring and enclosed by a perimeter fence for security. It should have the following components:

- Weighing scale / Weighbridge
- Changing/Washroom/Rest rooms and creche, as required
- Receiving or tipping area
- Sorting/processing area
- Storage area for recyclables
- Residual storage area
- Admin/ Record room/First Aid Room
- Fire Extinguishing facilities
- Water and electricity connection.
- Adequate space for the entry and exit of waste transporting vehicles.

Broad guidelines for Material Recovery Facilities for different cities

i) ULBs having population up to 50,000 and waste generation of approximately 15 to 20 tons per day (TPD), assuming more than 50% of door-to-door collection and segregation of waste.

MRF Component	Indicative value
Design Capacity	3-5 MRFs in a ULB, (1, 2, 5 TPD each) as per the ULB's requirement
Manpower	10-12 per MRF
Area Requirement	1500-2500 sq.m (Approx.) This area includes basic infrastructure of segregation shed, utilization/ processing area for wet waste, admin / record room, parking of door-to-door vehicles and storage area for segregated recycles.
Indicative Capital Investment	Rs. 15-30 lakhs per facility excluding cost of land

Operation Cost	Rs. 15-17 lakhs per year includes honorarium/ salary and regular repair, maintenance cost and consumables.

ii) ULBs having Population between 50,000- 1, 00,000 and waste generation of approximately 35 to 40tons per day (TPD), assuming more than 50% of door-to-door collection and segregation of waste.

MRF Component	Indicative value
Design Capacity	3-5 MRFs in a ULB, (1, 2, 5,10 TPD each) as per the ULB's requirement
Manpower	15-18 per MRF
Area Requirement	1500-4000 sq.m (Approx.) This area includes basic infrastructure of segregation shed, utilization/ processing area for wet waste, admin/ record room, parking of door-to-door vehicles and storage area for segregated recycles.
Indicative Capital Investment	Rs. 15-45 lakhs per facility excluding cost of land
Operation Cost	Rs. 20-23 lakhs per year includes honorarium/ salary and regular repair, maintenance cost and consumables.

iii) ULBs having Population between 1, 00,000-5,00,000 and waste generation of approximately 200 tons per day (TPD), assuming more than 50% of door-to-door collection and segregation of waste.

MRF Component	Indicative value
Design Capacity	2-5 MRFs in a ULB, (50, 75, 100 TPD each) as per ULB's requirement
Manpower	25-30 per MRF
Area Requirement	6000-8000 sq.m (Approx.) This area includes basic infrastructure of segregation shed, utilization/ processing area for wet waste, admin / record room, parking of door-to-door vehicles and storage area for segregated recycles.
Indicative Capital Investment	Rs. 4.5-6 crores per facility excluding cost of land
Operation Cost	Rs. 60-70 lakhs per year includes honorarium/ salary and regular repair, maintenance cost and consumables.

iv) ULBs having Population between 5, 00,000-10,00,000 and waste generation of approximately 200 – 500 tons per day (TPD), assuming more than 50% of door-to-door collection and segregation of waste.

MRF Component	Indicative value
Design Capacity	2-5 MRFs in a ULB, (100 TPD each) as per ULB's requirement
Manpower	25-30 per MRF
Area Requirement	8000-10000 sq.m (Approx.) This area includes basic infrastructure of segregation shed, utilization/ processing area for wet waste, admin / record room, parking of door-to-door vehicles and storage area for segregated recycles.
Indicative Capital Investment	Rs. 6 crores per facility excluding cost of land
Operation Cost	Rs. 70-80 lakhs per year includes honorarium/ salary and regular repair, maintenance cost and consumables.

v) ULBs having 10, 00,000 plus Population and waste generation of approximately 500 tons per day (TPD), assuming more than 75% of door-to-door collection and segregation of waste.

MRF Component	Indicative value
Design Capacity	2-7 MRFs in a ULB, (100 -200-300 TPD each) as per requirement
Manpower	35-50 per MRF
Area Requirement	10000-20000 sq.m (Approx.) This area includes basic infrastructure of segregation shed, utilization/ processing area for wet waste, admin / record room, parking of door-to-door vehicles and storage area for segregated recycles.
Indicative Capital Investment	Rs. 18-20, 24-26 and 29-31 crores (for 100,200,300 TPD respectively) per facility excluding cost of land
Operation Cost	Rs. 65-80 lakhs per month includes honorarium/ salary and regular repair, maintenance cost and consumables.

Selection of MRF

ULBs must adopt the type of MRF as per their specific requirement depending upon the following aspects:

- Waste Quantity
- Waste characterization
- Availability of land
- Capital and Operational cost of facility (including cost of Manpower)
- Provisions/ Linkages for sale of recyclables and by products
- Type and linkage of final treatment/disposal facility

Siting Criteria for MRF

- MRFs need to be located close to existing roads, (movement of waste collection trucks should be considered to avoid traffic).
- MRFs must be near or within urban areas that generate the inputs to be processed for recyclables and the industries that will use the recycled materials.
- To be located near the residential areas, the facility must be both environmentally and aesthetically acceptable. A buffer space with trees / shrubs will help improve aesthetics and decrease any noise pollution.
- In a zoned area, MRFs are preferably located in an industrial zone or close to a sanitary landfill to facilitate efficient movement of waste from various generators and disposal of residual waste.
- MRFs should be located considering the local geographical features, in a safe manner.
- Flood-prone areas must be avoided.