



# Circular Economy Because Nature Knows No Waste

Materials Recovery Facility – Haritha Keralam Mission, Trivandrum

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# Materials Recovery Facility (MRF) - Jigani, Bangalore



# Materials Recovery Facility (MRF) - USPs



## Why MRF?

- Centralised processing
- Traceability of material
- Improved manpower efficiency through mechanization
- Aggregation helps in better price realization (increased selling rate) of dry waste
- Supply to authorised end destinations
- Skilling the BOP, dignity of labour, established career in waste management industry
- Safe working conditions - highest level of OH&S, fire safety
- Hygienic work environment
- Employee welfare and social security
- Automated fleet management and scrap inventory management
- Reduce pilferages

# 1. Define

## Criteria for mapping the existing waste management ecosystem:

1. Location/area proposed for MRF
2. Existing collection system at the catchment area
3. Types of waste expected
4. Quantity of waste expected
5. Model of operation
6. Capex funds available
7. Existing collection system at the catchment area
8. Proposed activities in immediate future
9. Details of authorised end destinations within the vicinity

## Typical waste metric from a Gram Panchayath (sample data from Nitte GP)

Sr.No	Particulars	Details	Comments
1	Name of the Taluk	Karkala taluk	Dry waste collection from entire Taluk
2	Name of the Gram Panchayath	Nitte Gram Panchayath	MRF location area
3	Number of Gram Panchayath in Taluk	34	There are 50 villages in Karkala Taluk
4	Population in Karkala Taluk	1,90,291	2011 census data
5	Present population (projected)	2,05,514	in 2019 (1% raise in each year)
6	Number of households in 34 G.P's	45,905	2017 survey data
7	Number of Commercial establishments	5,500	
8	a. Total quantity of household waste	4.60 TPD	4,600 Kg - avg of 100 g/day from each household
	b. Total quantity of commercial waste	2.75 TPD	2,750 Kg - avg 500 g/day from commercials
	c. Total bulk generators waste	0.50 TPD	Min 500 Kg of dry waste can be expected from various GP's from events & functions
9	Total dry waste generated per month in Karkala Taluk	7.85 TPD	235.5 MT per month



## 2. Design and Build

		Includes
1	Social inclusive model	✓
2	Service fee from waste generators	✓
3	EPR support for plastic and inerts	✓
4	Ethical sourcing incentives	✓
5	Support from Gram Panchayat for door to door collection	✓



## 2. Design and Build

- Project management and support from survey till steady state operations.
- Auditing and constant monitoring
- Support entrepreneur towards development of waste management landscape within catchment area
- Introduce various business models to ensure viability and self sustenance

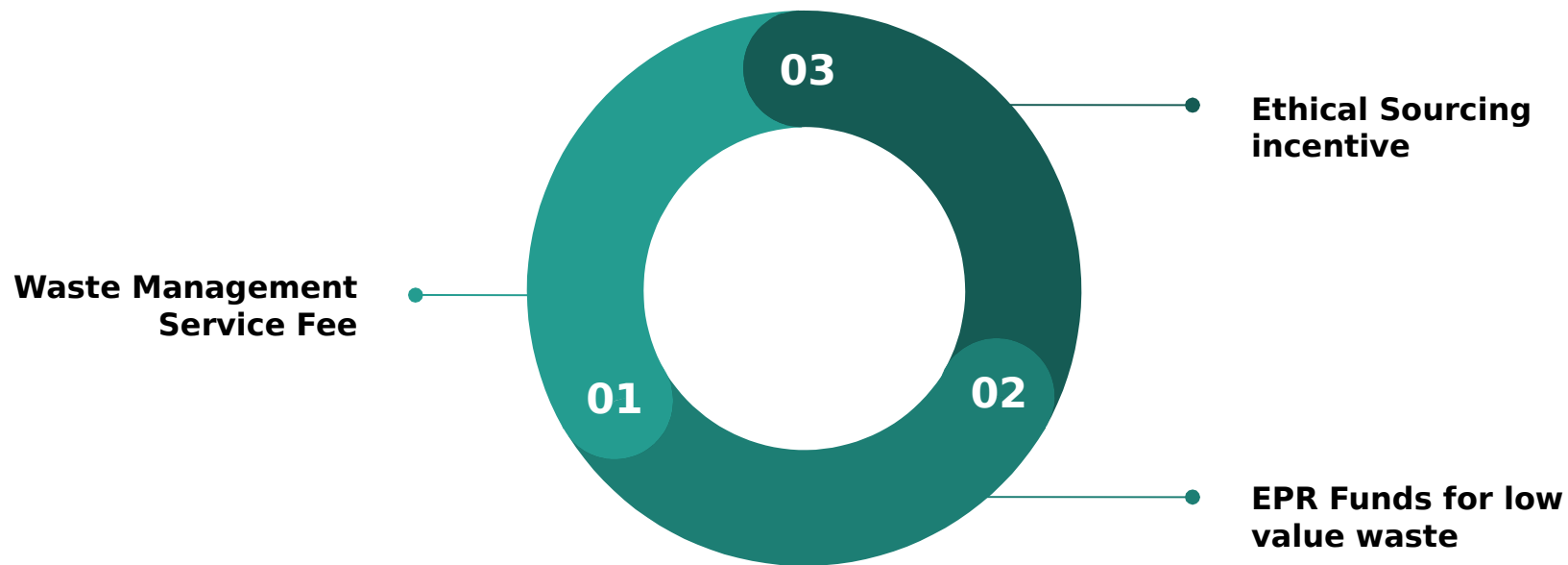


- Operate with full compliance and responsible waste management
- Uninterrupted operations at the MRF
- Create transparent marketplace for Waste Workers and other informal workers to sell dry waste
- Data capture and monthly reporting

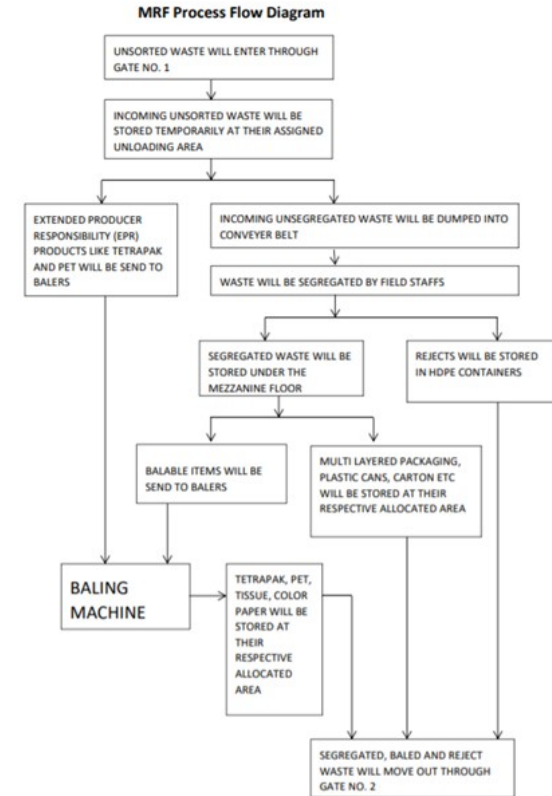
- Capital Cost (Infrastructure, machinery)

- Suitable vacant land (10,000 sft area for operations of 10T/day and 6,000 sft for operations of 5T/day)
- Door to door waste collections
- Collect monthly service fee from waste generators and provide to entrepreneur
- Safe and responsible management of sanitary waste, inerts & mixed waste

### 3. Self Sustenance



# MRF Process Flow





# MRF Checklist

## AN IDEAL UNIT SHOULD BE



## AN IDEAL UNIT SHOULD HAVE



# Capex



## Consulting for survey, design and implementation of MRF

Details	Amount (Rs)
Survey and recommendation	2,56,200
MRF solution design	3,73,800
Project management	4,91,400
Self sustained business	4,91,400
<b>Total</b>	<b>16,12,800</b>

Capital costs - 10MT/day - 10,000 Sft facility

Category	Item	Amount (Rs)	Comments
Infrastructu re - civil	Shed	1,20,00,000	@ Rs 1,200/ sqft. Semi Concrete/PEB Type
	Toilets		
	Ventilation System - Turbo/Ridge		
	RainWater Harvesting		
	StaffQuarters		
Infrastructu re - Office	Cabin +Meeting Room	2,50,000	500 sqft area (@ Rs 500/sft)
	Lunch/Rest Room	2,50,000	
	Furniture (Recycled Sheets)	2,00,000	
Electrificati on	Office - Fans, Lights	1,00,000	
	GPS	25,000	
	IOT	50,000	
	CCTV Camera	2,00,000	
	Shopfloor - Fans, Lights Connection	1,00,000	
	Points for Baler and Conveyor & MHE		
Equipment	Conveyor	24,00,000	60ft conveyor with Mezzanine Floor
	EPS Compactor (Thermocol)	5,00,000	
	Weighbridge	7,00,000	40T Capacity
	Backup Power (DG/Solar/UPS)	4,00,000	
	Baler	14,00,000	Twin Baler @ Rs 7L/baler
Material Handling Equipments	Pallets	2,00,000	100 Pallets @ 2000 each
	Semi Electric Stacker	2,00,000	For movement of bales on pallets
	Bins	2,95,000	
		Bin lifter	2,00,000
Truck	Truck to transport waste to MRF	20,47,000	
Safety	Fire extinguishers	1,18,000	
	Truck Life Lines	3,00,000	To be used for during tying/untying of Tarpaulin
Statutory	Trade License	15,000	
	Factories Act Registration	50,000	
	<b>Total</b>	<b>2,20,00,000</b>	

# Opex



Category	Details	Amount (Rs)/ Month	Comments
Manpower	Segregation Staff	2,15,264	8 FS per shift @ Rs 13454 CTC per FS
	Baling Staff	2,69,088	8 FS per shift @ Rs 16818 CTC per FS
	Stacker Operator	33,636	1 FS per shift @ Rs 16818 per FS
	Loading and unloading team	1,36,000	4 FS per shift @ Rs 16818 per FS
	Truck driver	16,818	1 driver @ Rs 16818 per person
	Helpers for truck	26,908	2 FS per truck @ Rs 13454 per FS
	Offie/ Admin	50,000	1 Admin or/ and 1 Floor Manager @ Rs 25,000 CTC
	Security	36,000	1 Security guard per shift @ Rs 20,000 CTC
	Housekeeping Staff	33,636	1 FS per shift @ Rs 16818 per FS
	Awareness Staff	40,000	1 Field Supervisor @ Rs 20000 per person
Maintenance	Repairs	10,000	
Utilities	Electricity	30,000	
	Petty Cash Expenses	10,000	Normal Day to Day Expenses
	Consumables	20,000	Gloves, Masks & other PPE
	Transportation	1,82,000	10TPD for 26 days @ 0.7/ kg
<b>Total operating cost</b>		<b>11,09,350</b>	Rs 4.27/ Kg

## Income & expenditure

Details	Rate (Rs/ Kg)	Amount (Rs)
Revenue through Service Fees (Rs/ Kg)	2.70	7,02,000
Revenue through sale of dry waste (Rs/ Kg)	2.12	5,52,193
Total Revenue (Rs/ Kg)	4.82	12,54,193

## Project Timeline

[illegible]

- Ensure that Gram Panchayats collect only **Dry or Non-biodegradable Waste** from all the waste generators in its jurisdiction;
- Setting up dry waste **storage facility for each /multi Gram Panchayat** and ensuring to process dry and wet wastes separately.
- Ensure that Gram Panchayat shall send the segregated Dry waste by **loading to the MRF truck by paying the processing fee** as per the **quantity generated/ HH's covered.**
- Ensure that **Recyclable Waste is not removed** from the Dry Waste sent to the MRF
  - Ensure that **timely payments** are made by all the Gram Panchayat to the MRF Operator
  - Assist **in hiring local personnel** required for collection and processing at **G.P level and MRF.**
  - Ensure that each Gram Panchayat shall **deploy 1 supervisor** and required personnel for carrying out **door to door awareness, monitor segregation of waste at source, collection of user fee.**
- **Sanitary wastes** also should be collected separately which will be disposed to **authorized Bio- medical waste management** agencies every week with the help of **local PHC's**
  - Conduct **regular public awareness programmes** focussing on segregation of waste at source and payment of user fee.

# Impact



- Inclusion of unorganised entrepreneurs into a formal supply chain
- Creating an incentive for supply of good quality carton
- Better living standards and career in waste management for all staff employed through this project
- Safe equitable opportunities for women across all levels supported by policies to avoid any form of discrimination
- Optimal working conditions for workforce through best industrial practices and ensuring fair incentives
- Creating an improved supply chain for reuse of carton with better price realisation
- Maximise resource recovery from waste
- Responsible management of waste to ensure diversion from landfill
- Reducing avoidable contamination through design for recycling
- Scientific management of waste to reduce greenhouse gases
- Reduce the negative effect of various operations and transportation of waste
- Creating traceability to ensure diversion from landfill and open burning of waste