

# ASSESSING SUSTAINABLE SOLUTIONS

## PLASTIC CIRCULARITY

Case of :Pimpri-Chinchwad Municipal Corporation & Chhatrpati Sambhaji Nagar Municipal Corporation



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# CITY PROFILE

## PIMPRI CHINCHWAD MUNICIPAL CORPORATION (PCMC)

 Total Population: 29,65,609 (2022)

 Total wards :32 divided into 8 operating zones


 Total waste collected in city/day: 1300 TPD

 Upto 100% waste collection (2023)

 **430 grams per capita/ Day**

## CHHATRAPATI SAMBAHJI NAGAR MUNICIPAL CORPORATION (AMC)

 Total Population: 16,67,000 (2023)

 Total wards :115 divided into 9 operating zones

 Total waste collected in city/day: Over 400TPD

 Upto 95-98% waste collection (2023)

 **280 grams per capita/Day**

## STUDY APPROACH

1. Sustainability in Solid waste Management i.e. achieving total operating expense from the revenue streams.

**Total Operations Expenditure = Revenue Generation**

2. Addressing the waste hierarchy as per SWM Rule 2016 which is :

I. Prevention	Most preferred
II. Reduction	
III. Reuse	
IV. Recovery	
V. Recycling	
VI. Disposal	Least preferred

*The end goal can **NEVER** be **maximizing** waste generation'*

PCMC by their way of operation encourages waste maximisation.

AMC by their way of operation discourages waste maximisation.

# PCMC WASTE MANAGEMENT



Total Population: 29,65,609 (2022)



Total wards :32 divided into 8 operating zones



Total waste collected in city/day: 1300 TPD



Upto 100% waste collection (2023)



430 grams per capita/ Day

BEHAVIOR  
CHANGE  
PROGRAM

4 Agencies, 2-way waste segregation, contract 12 months. [1:7500, adequate staff]  
*But still 75% segregating at source and no focus on waste*

COLLECTION &  
TRANSPORTATION  
TEAM

~~2 Agencies~~, (1 agency's subsidiary is running MRF & WTE for profit) [adequate vehicles]  
*However, staff are 30-40% under*

PROCESSING &  
TREATMENT  
TEAM

*paid*  
At MRF: 200 staff (paid on basis of dry waste sorting of valuable)  
At composting facility: 7-8 staff & mechanised

DRY WASTE  
PROCESSING  
FACILITY

*Same agency who has sublet running of MRF*  
1 for WTF (5Ton; buying plastic); MRF (sublet to aggregator against monthly income of 5-6 lakhs)+ 1 for bio medical

WET WASTE  
PROCESSING  
FACILITY

Technology: Windrow (with back hoe loaders)  
Capacity 500 Ton, generating 50ton compost

RDF  
MANAGEMENT

[adequate]  
1 for WTE capacity 14 MW (setup for profit) - running in full capacity



Waste to Energy plant (14MW) at Moshi Garbage Depo



MRF facility at Moshi Garbage Depo



Safai Sathis segregating high value waste from collected and dumped waste at MRF facility



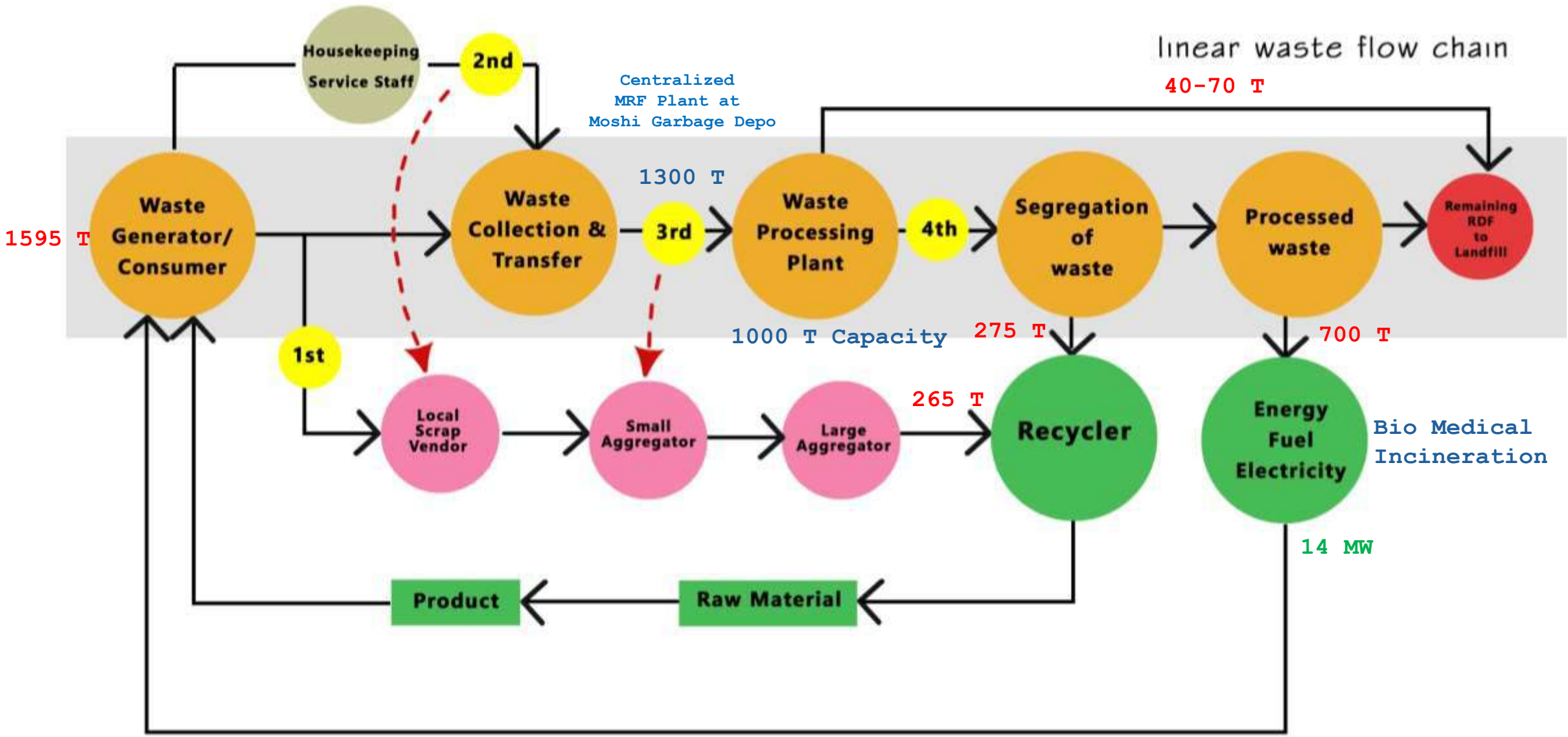


Waste to Fuel plant at Moshi Garbage Depo



Waste to Gatha plant at Moshi Garbage Depo

# PCMC WASTE FLOW CHAIN








Circular waste flow chain

linear waste flow chain

# AMC WASTE MANAGEMENT

## CHHATRAPATI SAMBHAJI NAGAR

-  Total Population: 16,67,000 (2023)
-  Total wards :115 divided into 9 operating zones
-  Total waste collected in city/day: Over 400TPD
-  Upto 95-98% waste collection (2023)
-  **280 grams per capita/Day**

BEHAVIOR CHANGE PROGRAM	2 Agencies, 2-way waste segregation, [Agencies working on few zones & engaged as per requirement] <i>65% segregating at source</i>
COLLECTION & TRANSPORTATION TEAM	1 Agencies, [inadequate vehicles] <i>Staff are 20-30% under paid</i> <i>Alternate day service is given at some places</i>
PROCESSING & TREATMENT TEAM	1 Agencies, 3 decentralised primary plant.150 T each <i>Total staff - 120 staff (Dry waste sorting staff of aggregators - 25)</i>
DRY WASTE PROCESSING FACILITY	<i>(Inadequate)</i> 1 Agencies, 2 MRF [Total - 15 TPD] <i>Recovery is approx. 30%</i> <i>60% is RDF</i>
WET WASTE PROCESSING FACILITY	Technology: Windrow (with back hoe loaders) Capacity 300 Ton, generating 40ton compost <i>Remaining mix waste.</i> [adequate]
RDF/RESIDUE MANAGEMENT	Cement factories linked for co processing <i>No landfill for 15% Inert &amp; non recyclable disposal</i>



Windrow Composting at Harsool MRF facility



Inside Harsool MRF facility



Inside Chikhalthana facility



Inert and RDF stored at Chikhalthana F Facility



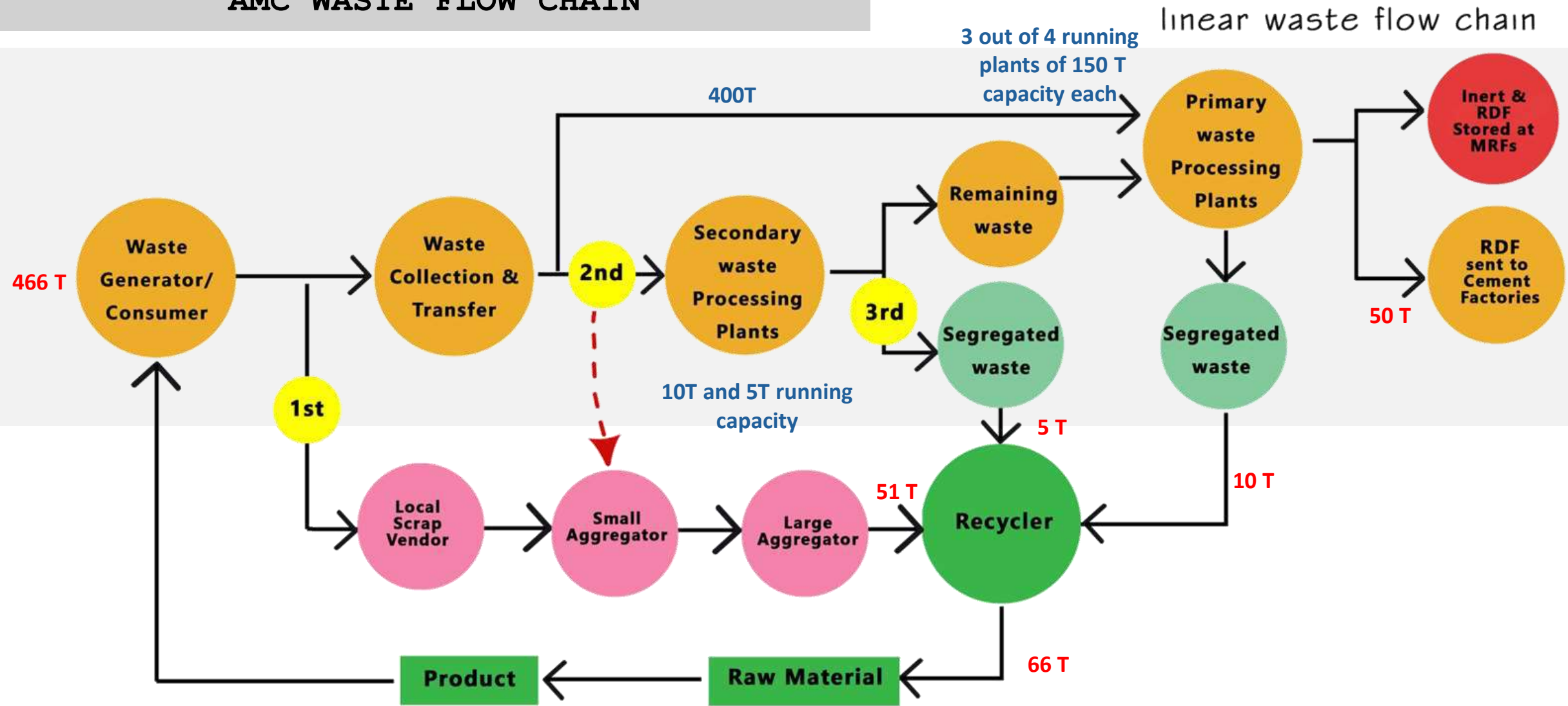
Ready compost after 4mm screening at Chikhalthana Facility





Recyclable Material at Chikhalthana Facility

# AMC WASTE FLOW CHAIN



Circular waste flow chain

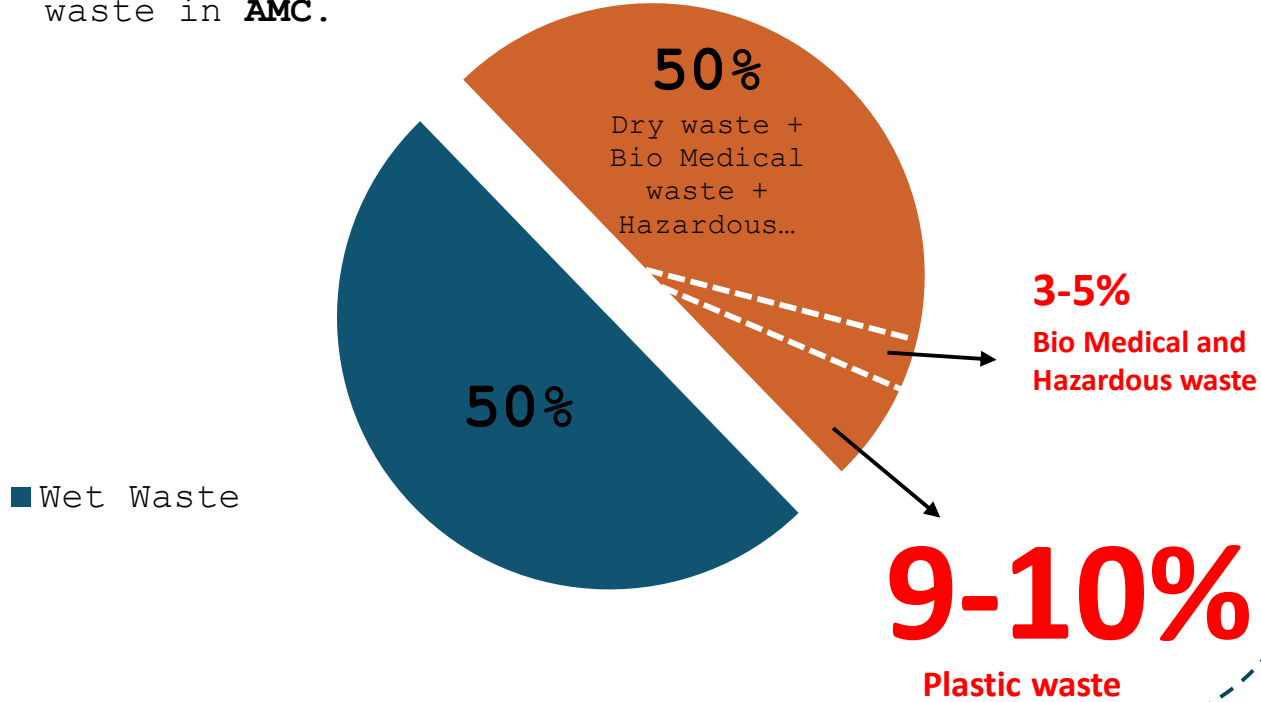
# COMPOSITION OF WASTE DERIVED BY PRIMARY SURVEY

PCMC = 570 Households = 0.13% of Total HH

AMC = 455 Households = 0.19% of Total HH

**75%** of surveyed HH are currently segregating waste in **PCMC**.

**60%** of surveyed HH are currently segregating waste in **AMC**.



# PLASTIC CIRCULARITY IN FORMAL & INFORMAL

## WAY

33 SMALL AND LARGE AGGREGATORS AND 16 LOCAL SCRAP VENDORS SURVEYED

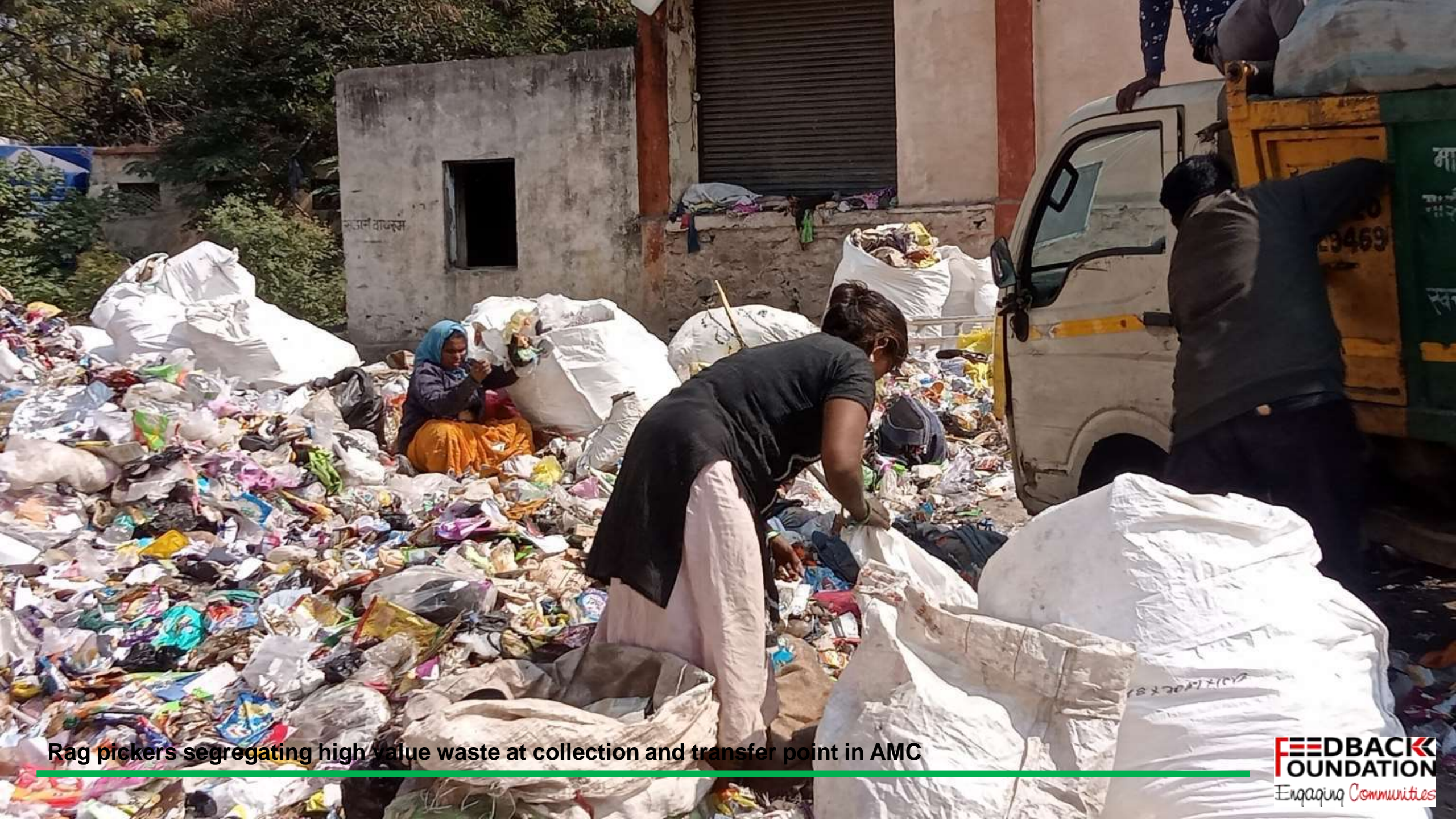
**100% of Plastic Waste** is already taken care at various level

PIMPRI CHINCHWAD MUNICIPAL CORPORATION (PCMC)		
	(In Ton)	(In %)
Total waste	1,595.00	100
Waste circularity at source level and CTPT level <i>(9.2% OF IT SOLD TO SMALL AGGREGATORS)</i>	295.00	<b>18.5</b>
Sent to MRF & MCC facility	1,300.00	81.5
<b>Waste Processed at MRF/MCC &amp; Waste to Energy plant sent from total waste generated)</b>		<b>(81.5%)</b>
Dry waste Processed	1,000.00	<b>62.6</b>
Wet waste Processed	300.00	<b>17.8</b>
Bio-Medical incinerated	25.00	<b>1.3</b>
RDF taken to Waste to Energy	<b>700.00</b>	<b>43.8</b>
Total sold to aggregators (Only from Source and CTPT)	<b>147.50</b>	<b>9.2</b>

PRIMARY SURVEY IN PROGRESS

**90% of Plastic Waste** is already taken care at various level

CHHATRAPATI SAMBHAJI NAGAR MUNICIPAL CORPORATION(AMC)		
	(In Ton)	(In %)
Total Waste generated in city	466.00	100
Waste circularity at source level and CTPT level <i>(7% OF IT SOLD TO SMALL AGGREGATORS)</i>	66.00	<b>14</b>
Sent to MRF & MCC facility	400.00	86
<b>Waste Processed at MRF/MCC (86% sent from total waste generated)</b>		
Mix waste	100.00	<b>21.4</b>
Dry waste Processed	60.00	<b>13</b>
Wet waste Processed	240.00	<b>51.5</b>
<b>Waste Sent After Processing at MRF/MCC</b>		
RDF taken to Cement factories	50.00	10.7
Dry waste sold to aggregators from MRFs	<b>15.00</b>	<b>3.2</b>
15% stored inert from processing plant at MRF	60.00	12.8
<b>Total Dry Waste sold to Aggregator</b>		
Total Sold to aggregators (From source & CTPT 33T + From MRF15T)	<b>48.00</b>	<b>10</b>

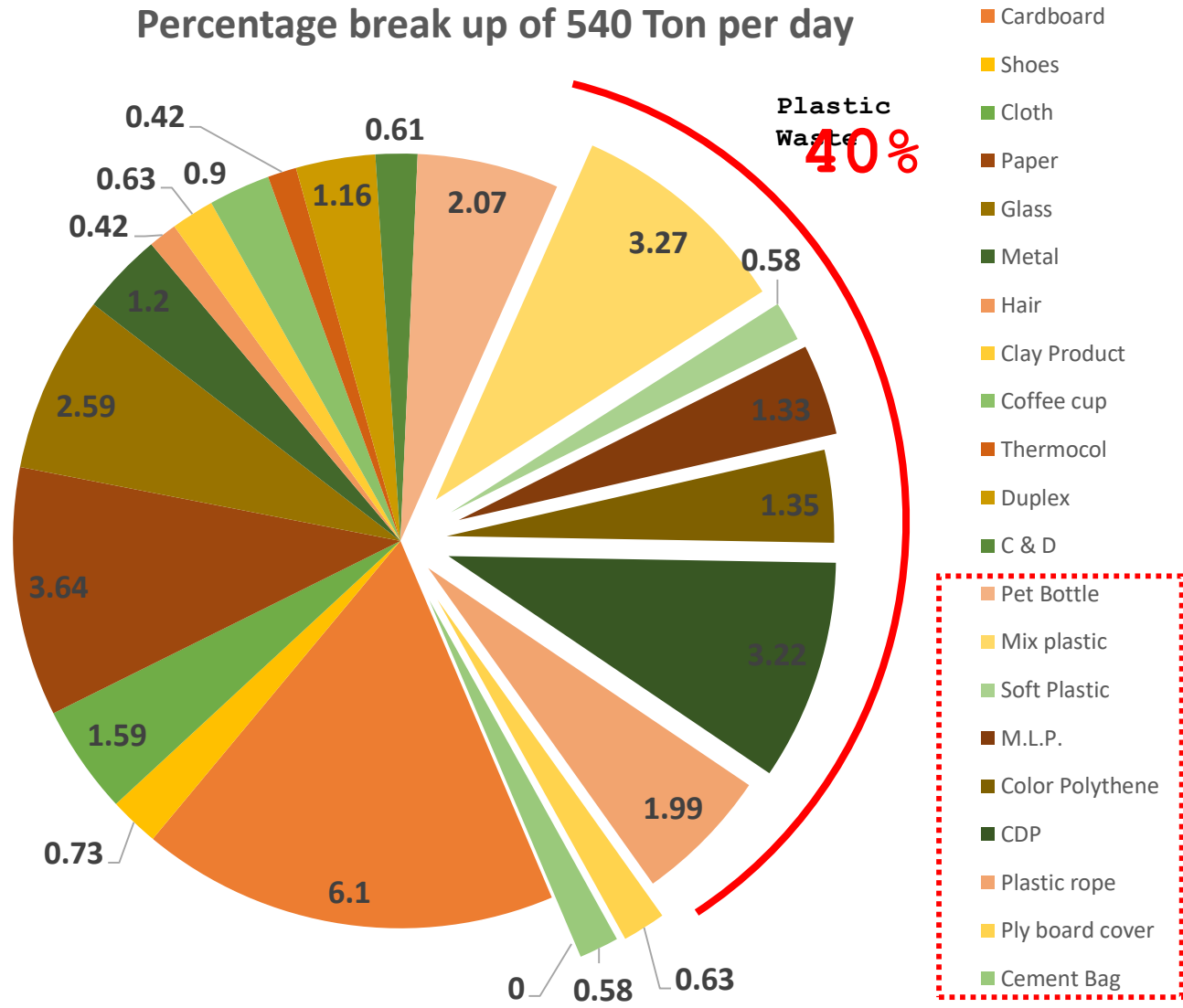


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Rag pickers segregating high value waste at collection and transfer point in AMC

# CUMULATIVE DRY WASTE DATA FROM AGGREGATOR IN PCMC

Percentage break up of 540 Ton per day



Data collected from **33 kabadiwalas** (aggregators) and **16 Scrap Vendors**

**147 TON** OF WASTE IS BEEN SOLD AT AVG RATE OF **3.5 RUPPEES**

~~BY CPTT AND REMAINING SEGREGATED WASTE FROM MRG IS SOLD AS~~

**PER BELOW COST:**

CATEGORIES OF SORTED DRY WASTE WITH PRICE RANGE OF SELLING ACROSS INDIA					
SR no.	Categories	Sub-Categories of Dry waste	Examples of item	Average cost across year (per kg)	Range (INR per kg)
1.00	Plastic	Polyethylene Terephthalate (PET)	Water bottles; Beverage Bottles; Food Packaging; Cosmetic and Personal Care Packaging; Household Product Containers	24.00	21 to 27
		Polypropylene (PP)	Containers; Plastic Caps and Lids; Medical Components; Automotive Parts; Household Goods - buckets, toys, kitchen ware	12.00	11 to 15
		High Density polythene ( HDPE)	Milk Pouches; Atta plastics bags; trash bags; detergent/ soap packages	10.00	8 to 12
		Low density polyethene (LDPE)	Light weight plastic bags; shoping bags (Colored, black, white); Cement bags	3.50	3 to 5
		Polyethylene (PE)	Multi Layer Plastic (MLP); packacking of snacks	1.00	1 to 2
2.00	Paper	Corrugated Card Board	Deep Corrugation; narrow corrugation	11.00	9 to 15
		Paper / paper bag		3.50	3 to 5
		Newspaper		4.50	3 to 6
		Millboard/ Paper board	Sweet boxes, egg tray, grey board	3.00	2 to 5
3.00	Metal	Aluminium can		65.00	50 to 80
		Steel		30.00	25 to 45
		Iron		25.00	20 to 30
		Tin		22.00	20 to 25
4.00	Glass	Colour Glass		3.00	1 to 3
		White Glass		5.00	3 to 5
		Beer Bottles		3.00	3 to 6
		Broken glass		2.00	1 to 3
5.00	Fabric	Jute gunny bags		4.00	3 to 5
		Cloth		1.00	1 to 2
6.00	Leather	Shoes/ sole		4.00	3 to 6
7.00	Rubber	Shoes/ sole		4.00	4 to 6
8.00	E-waste	Mix E-waste		15.00	12 to 16
9.00	CnD	broken tiles etc			

# KEY TAKEAWAYS:

## PCMC

### PIMPRI CHINCHWAD MUNICIPAL CORPORATION (PCMC)

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#### AREA OF IMPROVISATION

- Need to convert primary waste circularity at source level from Informal to Formal for maximum MRF resource recovery.  
**max Resource Recovery = Revenue Generation**
- Generated revenue from sale of dry waste can cover 10% of operating cost
- Improved in **CTPT wages**  
(Average salary of service staff is **less than 10K** per month)
- Achieving circularity by, **establishing user policy** as per primary survey, 50-60% of hh showed willingness to pay charges if they receive 100% service accuracy.

**KEY TAKEAWAYS :**  
**AMC**

**CHHATRAPATI SAMBHAJI NAGAR MUNICIPAL CORPORATION (AMC)**

**AREA OF IMPROVISATION**

- **Reduction of incoming mix waste** through segregation at source.
- **Strong IEC** in the highly dense old areas of the city especially zone 1 to 3.
- **Increase in number of collection vehicle** to ensure the daily door to door waste collection in all zones.
- Monitored & **dedicated secondary collection point** for all the zones.
- Improved in **CTPT wages**
- Integration & social inclusion of safai saathis
- A special processing zone for sweeping & GVP waste should demarcated.
- Processing plant with such high capacity of 150 TPD can run in 2 shift to ensure the proper resource recovery & higher efficiency.
- **Deployment of professional agencies** & manpower for waste sorting to improve the resource recovery at the plant. In such cases, low valuable waste will also contribute in materials circularity.
- **Space for storage/ disposal of 15% of Inert & non-recyclable** waste after processing at the facility

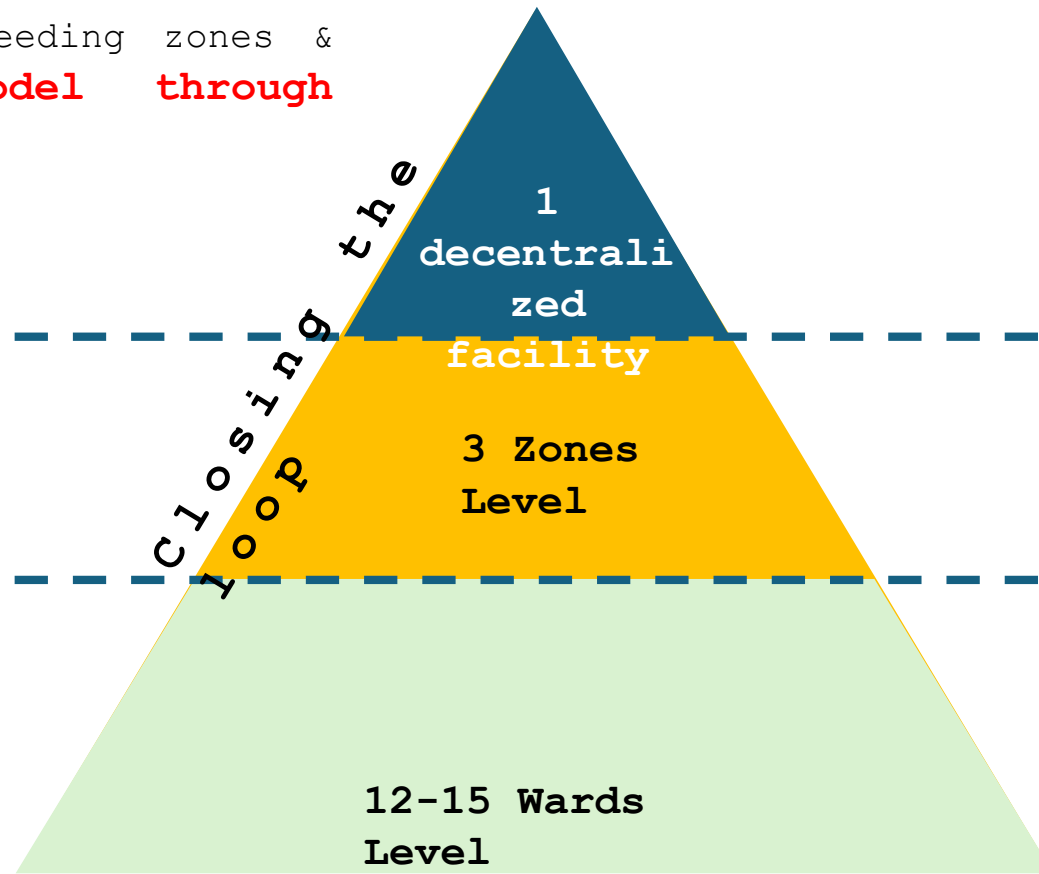
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<b>Total Dry Waste sold to Aggregator</b>		
Total Sold to aggregators (From source & CTPT 33T + From MRF15T)	48.00	10



# AREA OF INTERVENTION AT

## AMC

To have a high **positive impact**, it's important to **work in closed loop** to have higher efficiency. AMC works in decentralized system which gives a great opportunity to **target 1 decentralized system** along with its feeding zones & wards **to make a model through interventions.**



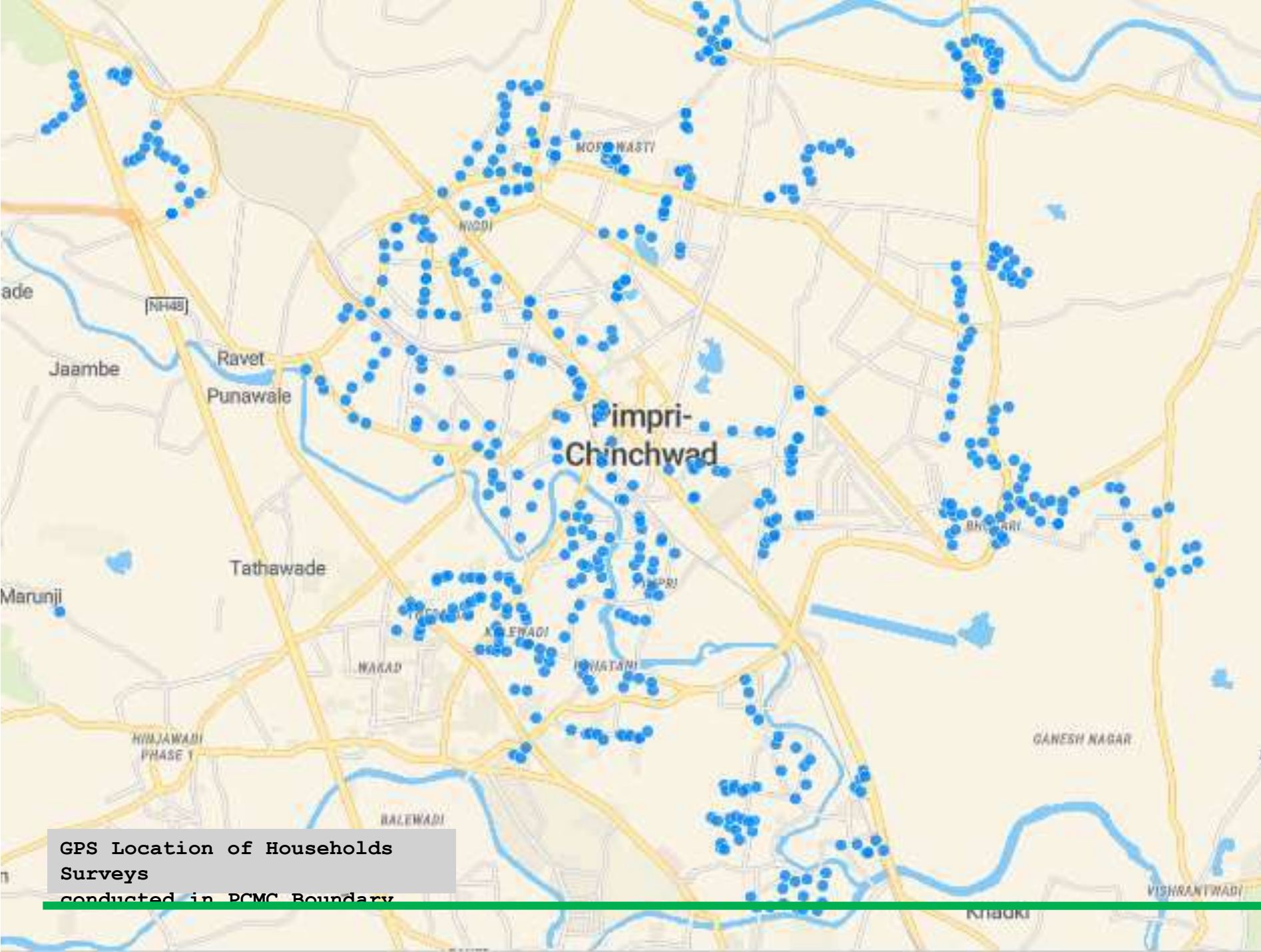
### Model decentralized processing plant

- Maximum dry waste resource recovery
- Drastic reduction in mix waste
- Systematic improvement in facility infrastructure
- Trained PT staff
- Compost through pure wet waste
- Separate processing for sweeping & GVP waste
- Reduction of inert to less than 10%
- Maintained & monitored secondary transfer station.
- Proper segregated waste collection through compactor/ tipper
- No waste mixed from surrounding areas
- 90% source segregation achieved in 4 way
- CT staff trained
- Behavior change in high density areas
- 100% waste collection on daily basis
- Reduction in dumping & GVP

## INTERVENTIONS

# SUPPORT TOWARDS

<b>Direct operating cost</b>	In-charge for Sanitation Park
	Sanitation Park maintenance
	Training and workshops
	Staffs for Collection, Transportation, Processing, Treatment of waste.
	Fuel & maintenance of collection vehicles
	Machine repair and maintenance
<b>Capital cost</b> for retrofitting the existing facility	Construction/ Retrofitting of Facilities
	Development of RRR center
	Architect/ Structural Engineer/ other consultants
	Procurement of machineries such as: Shredder machine, Conveyor belt, Bailor, Autoclave machine, Incinerator, Sieving machine, Curing racks.
	GVP beautification/ Way finding signages/ Branding
<b>IEC, Behavior change program cost</b>	IEC and Capacity Building Specialists
	Citizen mobilisers for IEC and waste reduction activities
	Stationery for print media communication
<b>Agency's Management cost</b>	Team Leader [Need based]
	Project Manager
	M&E and MIS Consultant
	HO support for Admin, HR, Logistic & Knowledge Management and Documentation [Need based]
	Rental & maintenance for Office cum Guest house
	Local Conveyance for deployed team
	Outstation travel and stay for Team Leader
	Admin expense



### PCMC (Survey sample)

- 570 Household
- 35 RWA
- 15 Institutes
- 20 Commercial
- 33 Kabadiwala
- 16 Scrap vendors
- 7 CTPT

### AMC (Survey Sample)

- 455 Household
- 20 RWA
- 16 Institutions
- 15 Commercial
- 14 Kabadiwala
- 8 Scrap Vendor
- 10 CTPT

Thank you