RAMKY GROUP

Towards sustainable growth

Ramky Enviro Engineers Limited

Moving Towards Sustainable Waste Management

Waste

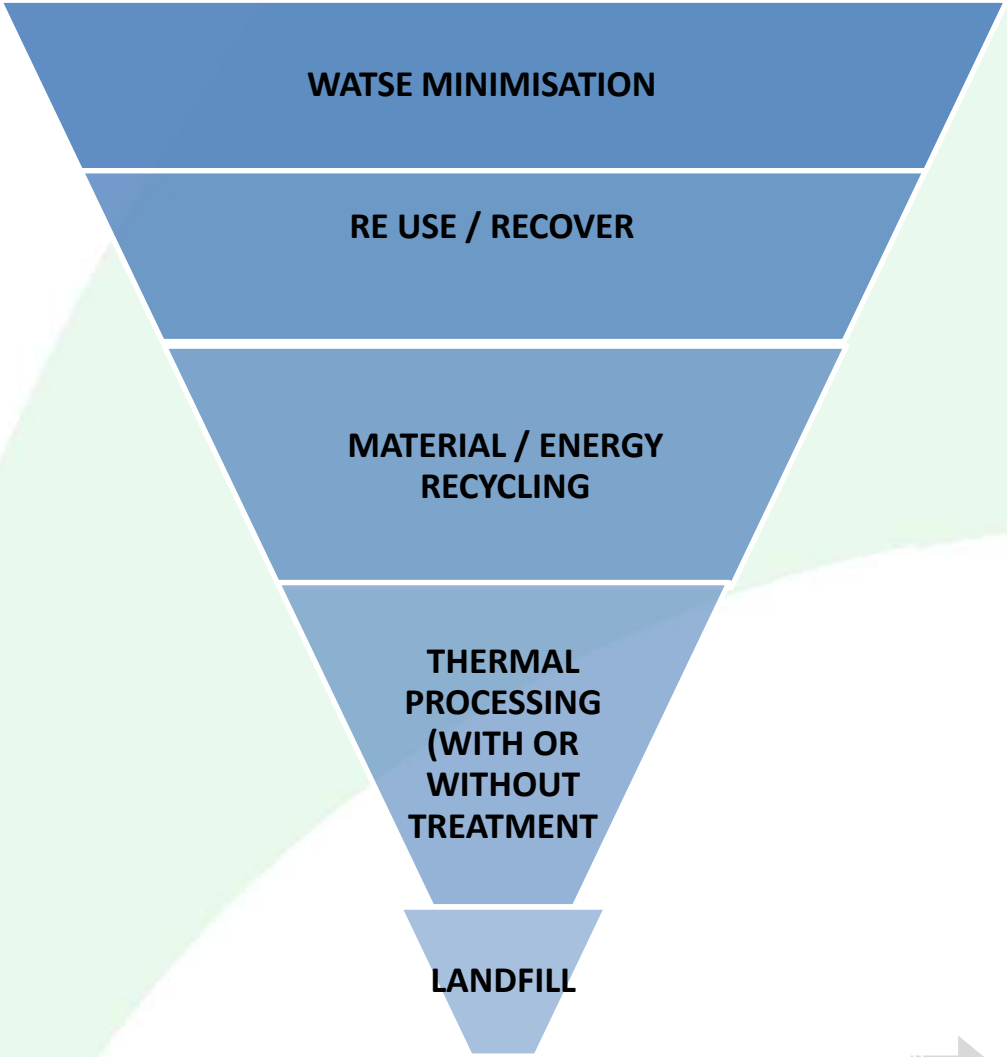
- Lack of value
- Industrial Waste - Hazardous

  corrosive, reactive, ignitable , toxic
- Municipal Waste - Putrescible, odorous, nuisance

  Bio-degradable, non-biodegradable

Waste Management - Sustainable Approach

- Economically Affordable
- Socially Acceptable
- Environmentally effective and safe



Best Practices

Waste Management

- Control Depletion of Land Consumption
- Control consumption of fossil fuels
- Control Depletion of Natural Resources
- Recovery of Energy and Resource

Handling & Management of MSW – conventional approach

- Burning of waste
- Disposal in a dump site (unlined)
- Disposal in landfill
- Production of compost and disposal of rejects in to landfill
- Production of Refuse Derived Fuel
- Waste to Energy

Refuse Derived Fuel (RDF)

Refuse Derived Fuel (RDF) can be defined as combustible fraction of Municipal Solid Waste (MSW) which has been segregated, processed, shredded and densified suitably to meet the alternate fuel requirements in the industry such that it has an optimum calorific value and consistency in quality.

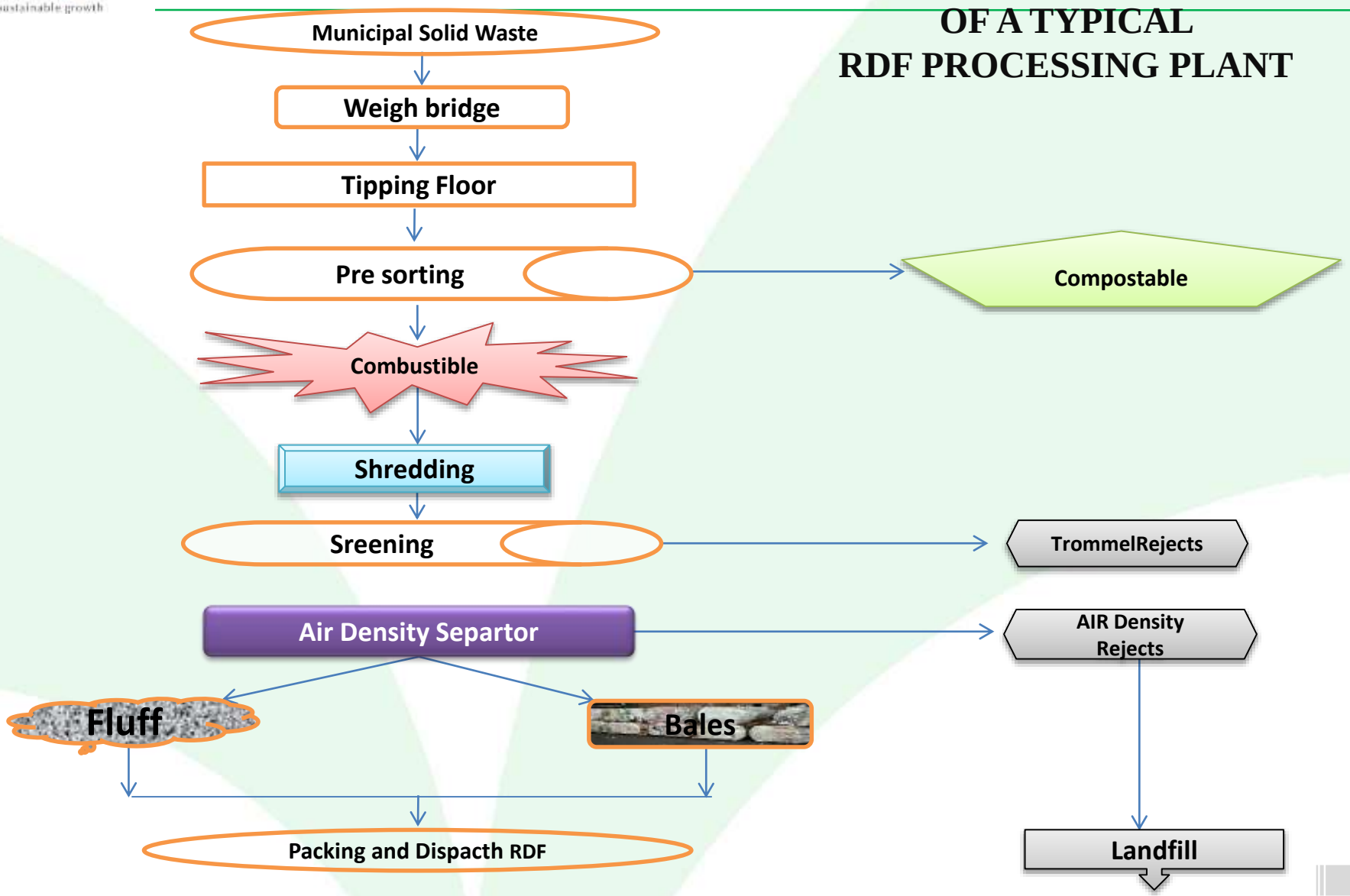
RDF (FLUFF FORM)

Fuel Characteristics in India

Sr. No.	Description	Characteristic
1.	Form	Fluff Form
2.	Size	75 mm edge to edge
3.	Bulk Density	350 to 450 Kg/cu.m
4.	Moisture Content	20 to 25%
5.	Ash Content	20 %
6.	Calorific Value	2500 - 3000Kcal/Kg

PROCESS FLOW

OF A TYPICAL RDF PROCESSING PLANT



RDF Shredder machine

Shredder with power and trammel connections

Screened material conveyor for air blowing

RDF Screening trammel

Types of RDF:

RDF (FLUFF FORM)

RDF PELLETS

RDF BRIQUETTES

RDF BALES

Types of RDF

Class	From	Description	Remarks
RDF-1	Raw (MSW)	Municipal solid waste as a fuel in an as discarded form without oversize bulky waste	This is the fuel intended waste to energy and predominantly the dry waste from commercial establishments and education institutions. Such waste can also be used directly in cement kilns
RDF-2	Coarse (c-RDF)	MSW processed to coarse particle size with or without ferrous-metal separation, such that 95% by weight passes through a 6-in-square mesh screen	This is a simple screening – sort of pre segregation to remove the compostable waste and resultant waste is dry with enriched Heat value having potential to be used in waste to energy and cement kilns
RDF-3	Fluff (f-RDF)	Shredded fuel derived from MSW processed for the removal of metal, glass, and other entrained inorganic; particle size of this material is such that 95% by weight passes through a 2-in-square mesh screen; also called “fluff RDF”	This is further increase the heat value of the RDF to specific needs of RDF Users like cement plants who require such high heat value fuel to reduce their fossil fuel consumption and primarily the market is determined by demand.

Types of RDF

Class	From	Description	Remarks
RDF-4	Powder (p-RDF)	Combustible waste fraction processed into powdered from,95% by weight passing through a 10-mesh screen (0.035-in.square)	This is the originally intended RDF Fluff prior to the making of the Briquettes and pellets. However , this is very expensive and not scalable beyond 10 TPD with high O&M costs with little global precedence.
RDF-5	Densified (d-RDF)	Combustible waste fraction densified (compressed) into pellets, slugs, cubettes, briquettes, or similar forms	Not commercially scaled up
RDF-6	Liquid	Combustible waste fraction processed into a liquid fuel	R&D set up only at present
RDF-7	Gas	Combustible waste fraction processed into a liquid fuel	Do

MSW /RDF Indian Scenario

Parameter	MSW	RDF
Calorific Value	800 to 1000Kcal/Kg	3100Kcal/Kg
Moisture Content	50%	<15%
Inerts	37 %	<2%

MUNICIPAL SOLID WASTE

REFUSE DERIVED FUEL
(FLUFF FORM)

Market Opportunities / Demand

- Cement Industries
- Thermal Power Plants
- Boilers (Conventional Boilers)

RDF Customers

- Bharathi Cement Corporation Pvt Ltd
- Ambuja Cement Ltd (Maharastra)
- Ambuja Cement Ltd (Chattisgarh)
- Wadi Cement Works
- Shalivahana Green Energy Ltd
- Vasavadatta Cements
- Zuari Cements Ltd
- Others

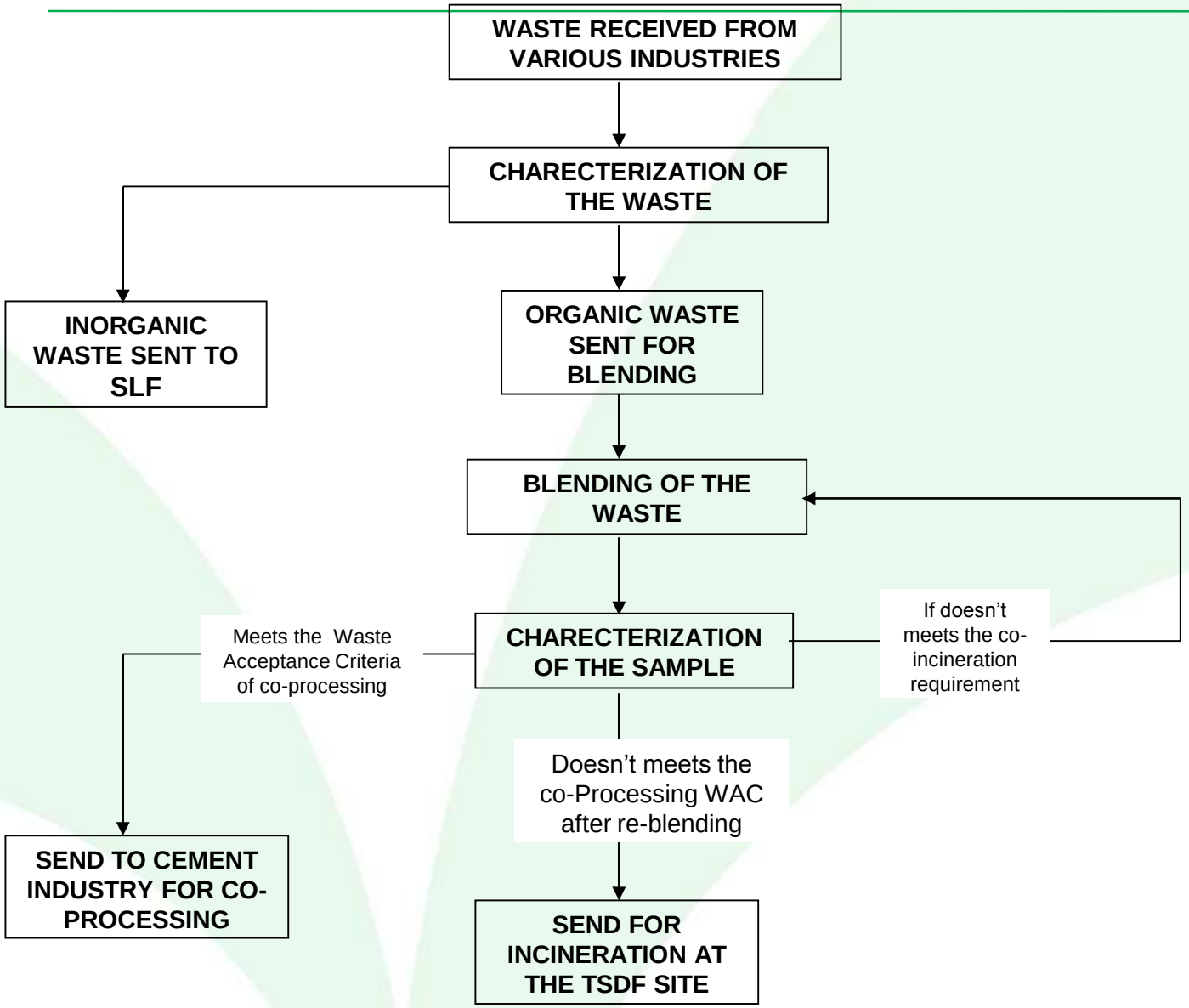
Way Forward

- Separating and Densifying >100 mm fractions of MSW and making it as RDF

- Identifying Thermal Power plants, Cement Plants, Boilers locally nearby to encourage utilization of waste for recovery of energy / resource

- Educating and encouraging industries to use RDF as a co-firing fuel along with conventional fossil fuels duly equipping with pollution control systems

Haz Waste Management At TSDF- Process Flow



AFR - Approach

- Utilization of waste as
  - Alternate Fuel
  - Raw Material

- As Fuel :
  - High calorific value (heat value)
  - Recovery of Energy

- As Raw Material :
  - waste rich in Ca, Fe, Al etc., directly used as RM
  - Resource conservation

Regular Permission given by CPCB for Co-processing

- **A. Hazardous Wastes**
- 1. Paint Sludge from automobile sector
- 2. Petroleum Refining sludge
- 3. TDI tar waste
- 4. ETP sludge from M/s BASF India Ltd.

- **B. Other Wastes**
- 1. Plastic Wastes
- 2. Tyre chips

Specification of HW for use of energy recovery

Parameter	Limit
Calorific Value As received basis	>2500 k Cal/Kg
Ash	
-Liquid	< 5%
-Solid	< 20%
Chloride	< 1.5 %
Halogens (F+Br+I)	< 1.0 %
Sulphur	< 1.5 %
PCB/PCT (ppm)	< 50
Heavy Metals (ppm)	
Hg	< 10
Cd+Tl+Hg	< 100
As+Co+Ni+Se+Te+Sb+Cr+Sn+Pb+V	< 25,00
pH	4 to 12
Viscosity (cSt) for Liquid	< 100
Flash point (Deg Centigrade) (for Liquid)	> 60

Specification of HW for use as Alternative Raw Material

Parameter	Limit
Volatile organic Hydrocarbon	< 5000 ppm
Total organic Carbon (TOC)	< 1000 ppm
CaO + SiO2 + A1203 + Fe203 + SO3 (In Ash)	> 80 %
Chloride	< 1.5 %
Sulphur	< 1.5 %
PCB/PCT (ppm)	< 5.0
Heavy Metals (ppm)	
Hg	< 10
Cd+Tl+Hg	< 100
As+Co+Ni+Se+Te+Sb+Cr+Sn+Pb+V	< 10,000

ISSUES

•Despite co-processing having inherent advantages, a careful approach is called for in view of hazardous nature of substances being handled.

• Many of which has potential to create havoc in terms of transportation, handling, storage and processing itself.

• Further the mechanism to be followed for co-processing hazardous wastes, has to confirm to the Rules and Regulations as per Hazardous Waste Rules.

Wastes not recommended for co-processing

- **Biomedical waste , Asbestos containing waste, Electronic scrap, Entire batteries, Explosives, Corrosives, Mineral acid wastes, Radioactive Wastes, and Unsorted municipal garbage.**

Direct handling by Cement Plants - Issues

- Not the core business
- Percentage of quantum are in traces
- Additional investments for pre-treatment and homogenization
- Pre-treatment costs
- Additional man-power
- Short term attraction

Direct handling by Cement Plants - Issues

- Can not serve the customer for all kinds of incinerable wastes they generate
- Quantities are not guaranteed
- Wastes are heterogeneous
- Issues with
  - **Product quality**
  - **emissions**
    - ✓ **Ambient**
    - ✓ **Fugitive**
    - ✓ **Stack**

Advantages passing waste through TSDFs

- There is no additional investment
- Wastes come to the cement plants as per the required quantities and required characteristics in a homogenized manner.
- No head-ache of hazardous waste transportation which it self is a specialized task which is certainly not the domine activity of cement plants
- Monitoring of regulatory agencies is easy wrt. Transport of waste through TSDF rather than transport directly by industries to n-number of cement plants.

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THANK YOU