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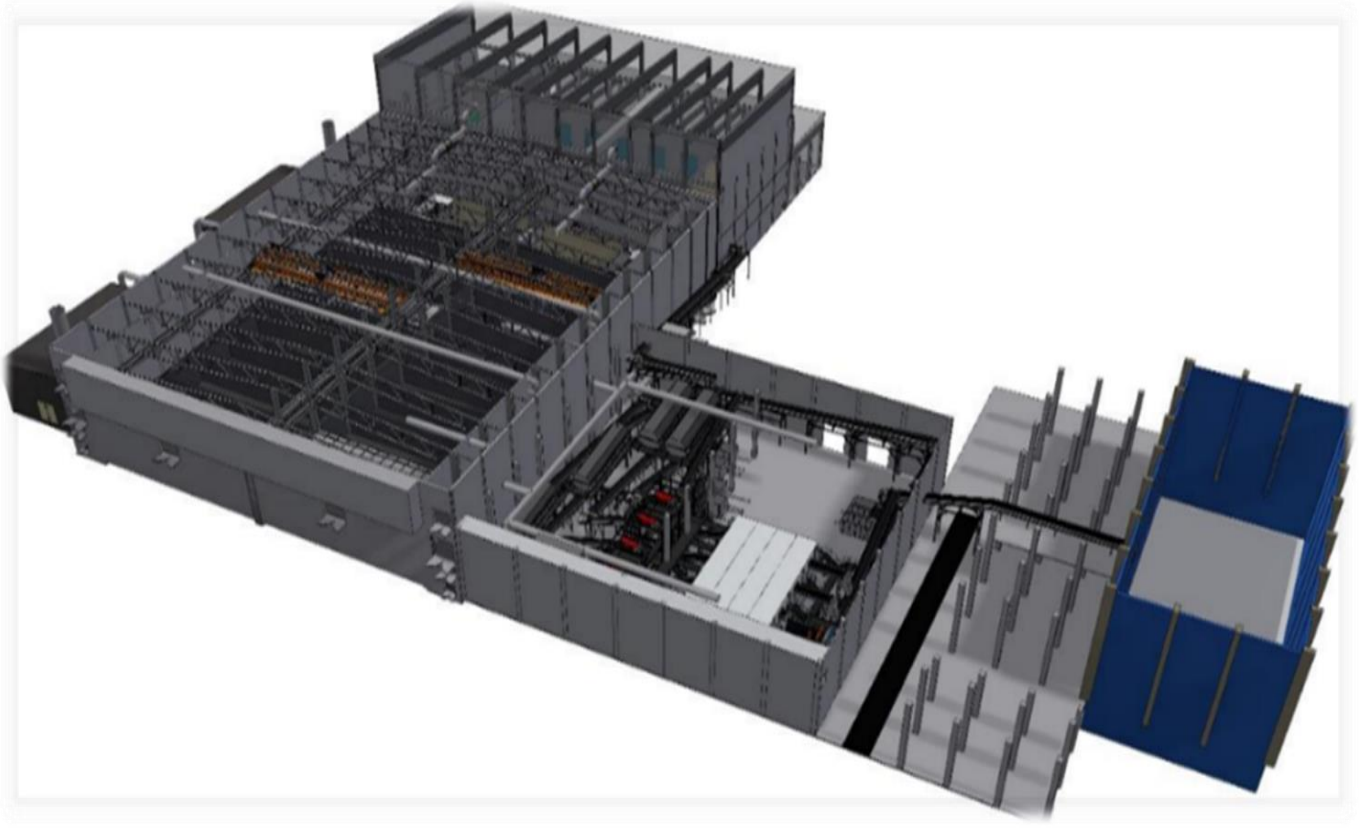
mas WASTE TREATMENT



We are a project undertaking, consulting and energy company that develops technology and produces energy efficiency solutions that lead to change.

mas

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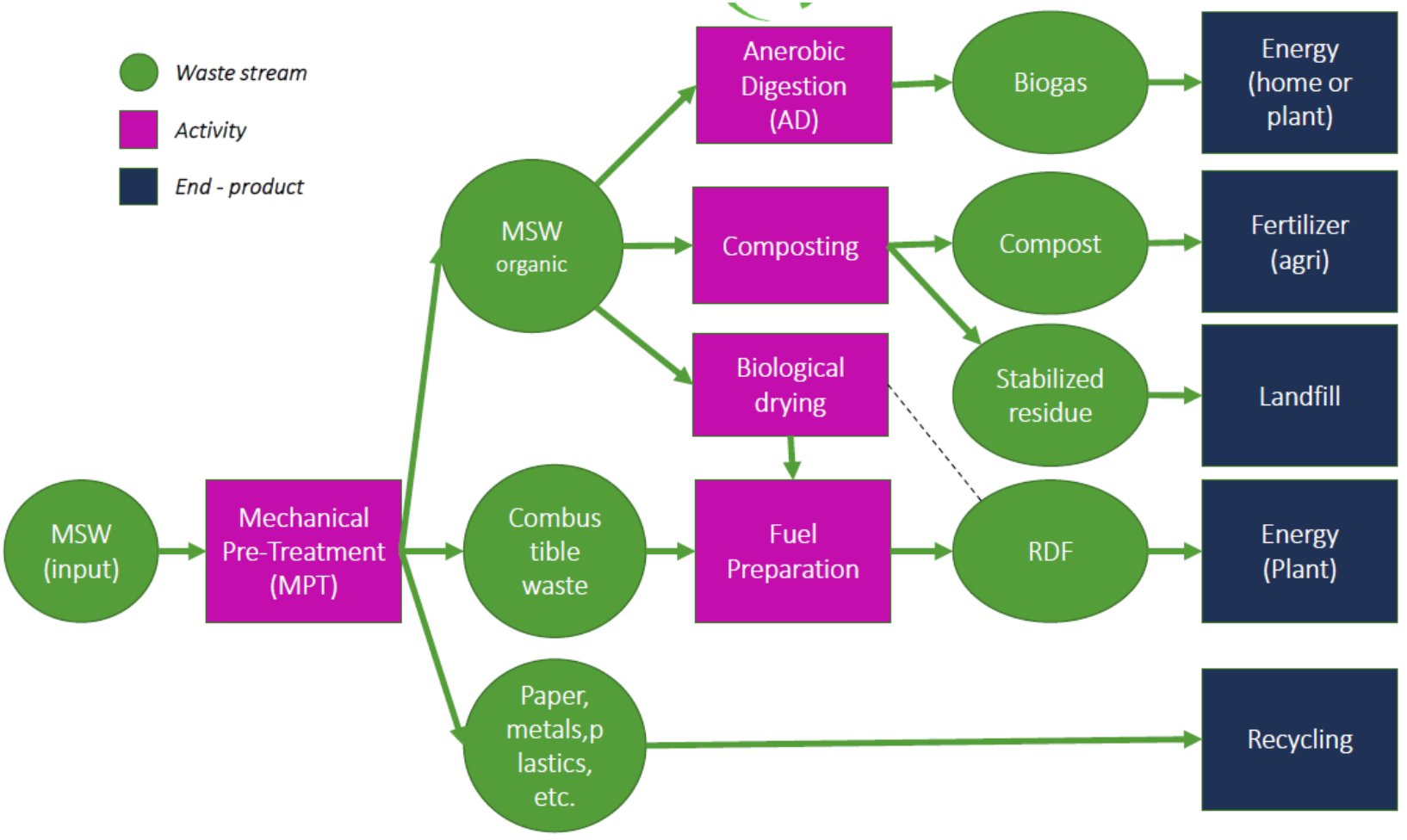
WASTE TREATMENT



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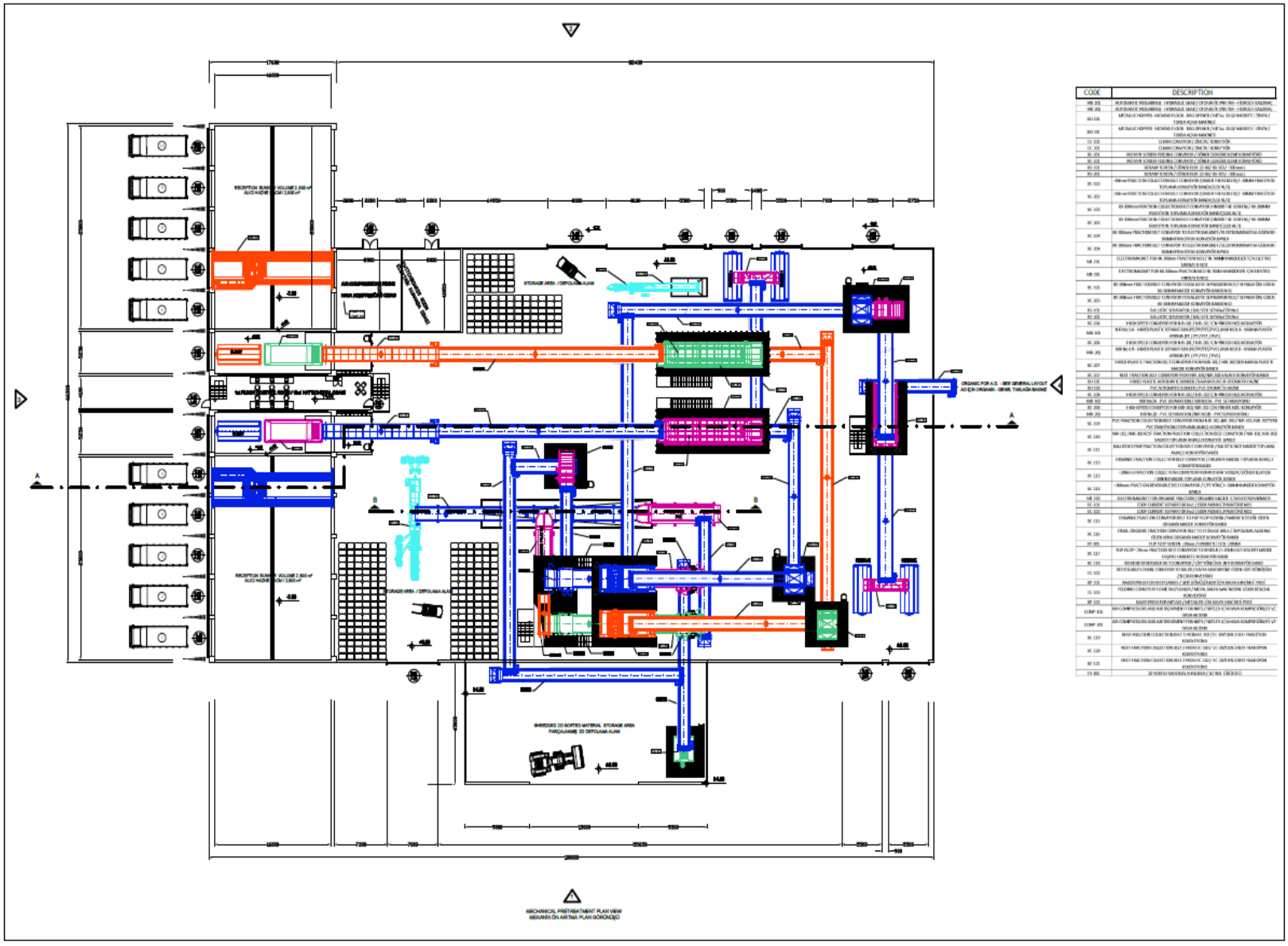
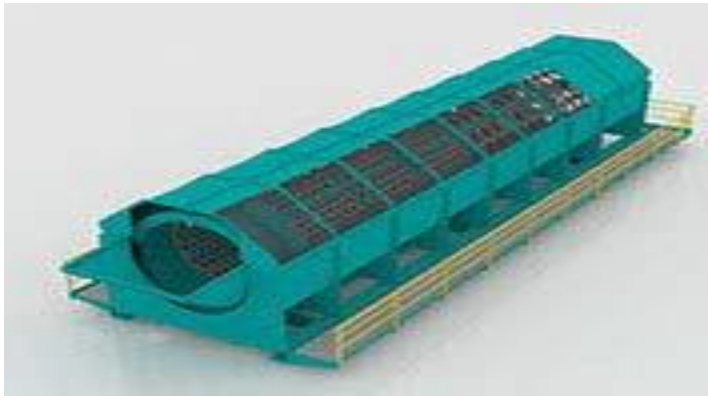
MECHANICAL TREATMENT



BAG OPENER

- Sieving cutting table to define the output size, separated from the machine.
- Adjustable output size with the changeable cutting table.
- Lower maintenance and simple management.
- PLC managed shaftrevolution cycle.



TROMMEL SCREEN

- 1-meter screen compartments
- All the screens can be changed easily. In design, Trommel screen drum has funnelsaround the sieves holes to avoid blockage and stumbling. (These funnels prevent blockage and stumbling and minimizes cleaning process)
- Speed adjustment (Forward- backward control)
- Inclined towards the direction of flow

SORTING

SORTING

OVER BAND MAGNET

- Capable of towing minimum 3 cm sized Ferrous metals from 30 cm height.
- Easy assembly and maintenance
- Equipped with long-lasting magnets.
- Unit can be integrated with the PLC system

OPTICAL SEPERATOR

- Thanks to high-speed Valve Block system, the opening and closing times of valves are extremely low.
- The revolutionary FLYING BEAM® technology can sort materials with very low operating costs and very high performance in effectiveness and purity.

SORTING

BALLISTIC SEPERATOR

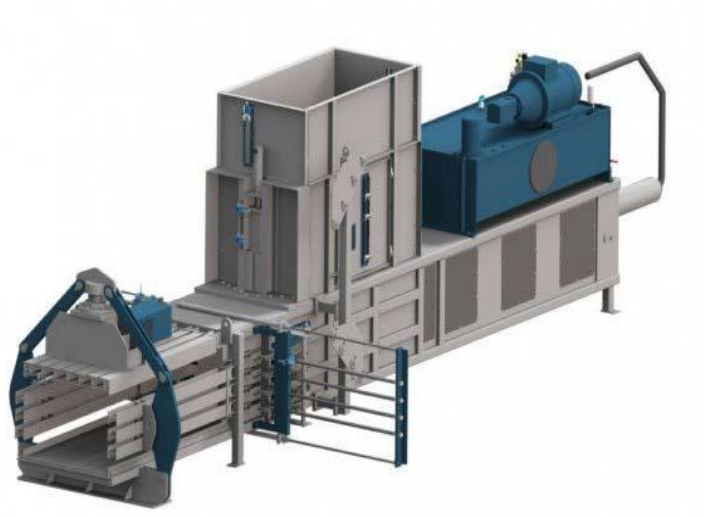
- 100 m3/hour capacity up to 500 kg/m3 density.
- No risk of music/video tapes or plastic film etc. wrapping with drive components
- Low maintenance requirement and low running costs
- 92% separation efficiency (except styrofoam, foam manufactured goods, completely flattened aluminum cans, plastic bottles)

EDDY CURRENT SEPERATOR

- Separates non-Ferrous metals with high efficiency.
- Large non-ferrous metals are separated with high efficiency thanks to extensive magneticfields.

HORIZANTAL

- Optimum bale weight is guaranteed thanks to 120 Ton pressing force.
- Equipped with Pizzato and Siemens safetyunits.
- Touch screen PLC automation system
- Equipped with an automatic head-piston design that allows it to bale different types of waste with the same firmness.



SORTING

WHAT IS RDF?

- The combustible fraction recovered from mixed MSW has been given the name refuse derived fuel or simply **‘RDF’**

RDF

REFUSE-DERIVED FUEL

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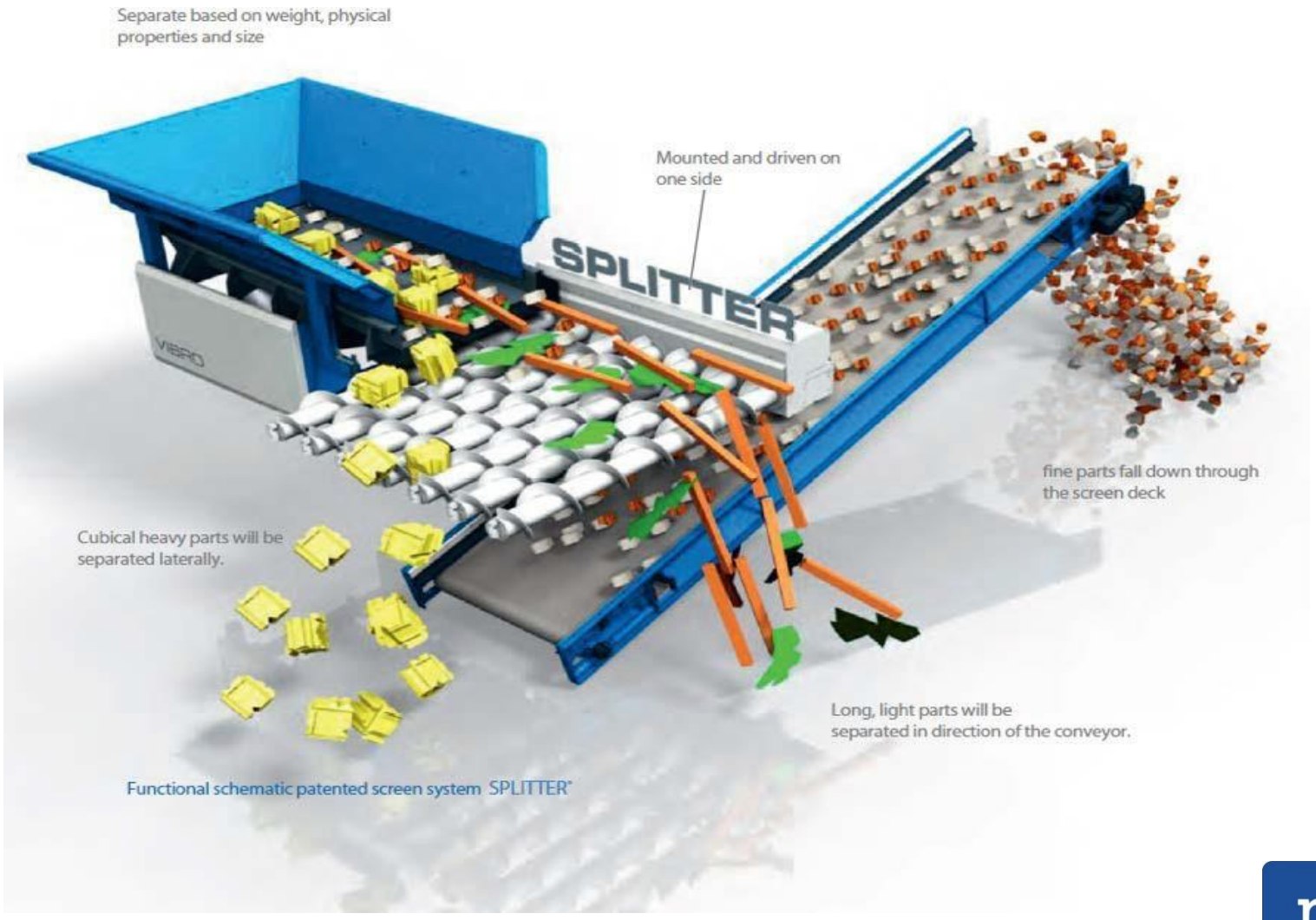
SIZESCREENING

- Size screening involves separating the municipal waste based on the size and shape of the particle. It helps in material handling comfortably.



RDF

REFUSE-DERIVED FUEL

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MAGNETICSEPERATION

- Magnetic separation is a process in which magnetically susceptible material is extracted from a mixture using magnetic force
- This process is useful in separating the metal particles from the crushed particles. Because metal particles are not suite for RDF

RDF

REFUSE-DERIVED FUEL

SHREDDING

- Shredding involves the process of destructing the large amount of solid waste into smaller pieces by crushing and cutting.
- The process converts the larger particles of municipal waste into smalller particles for easy handling and transporting

RDF

REFUSE-DERIVED FUEL

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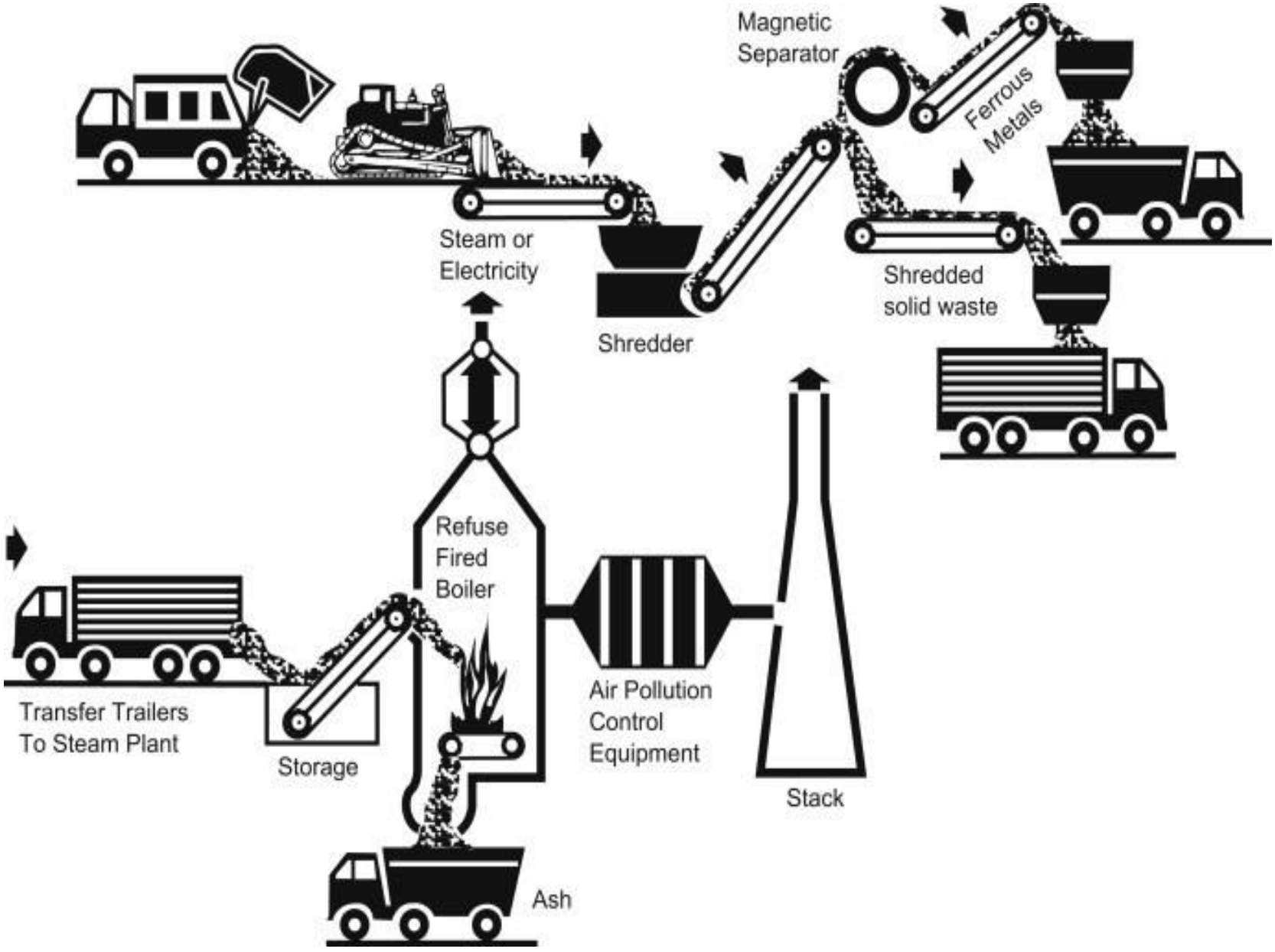
RDF

FLOW DIAGRAM



COMPARISON
COAL VS RDF

Fuel Factor	COAL	RDF
CALORIFIC VALUE (Kcal/Kg)	4000	3500 -- 3700
EQUIVALENT TON in CV	1	1.14
COST PER TON in Rs.	6000	2000
SULPHUR CONTENT (weight %)	0.4	0.2 -- 0.5
MOISTURE CONTENT (weight %)	39	10
ASH CONTENT (weight %)	4.2	< 15
NOX CONTENT (weight %)	1.2	1 - 1.5
CARBON (weight %)	31.4	35 - 40
OXYGEN (weight %)	7.4	25 - 30
HYDROGEN (weight %)	4.3	5 -- 8

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What is Landfill Gas (LFG)?

Landfill gas is a complex mix of different gases created by the action of microorganisms within a landfill. Landfill gas is approximately 40% to 60% percent methane, with the remainder being mostly carbon dioxide. Trace amounts of other volatile organic compounds (VOCs) comprise the remainder (<1%). These trace gases include a large array of species, mainly simple hydrocarbons.

The importance of LFG plants is seen more clearly since 25% of the methane gas emitted to the atmosphere originates from landfills!

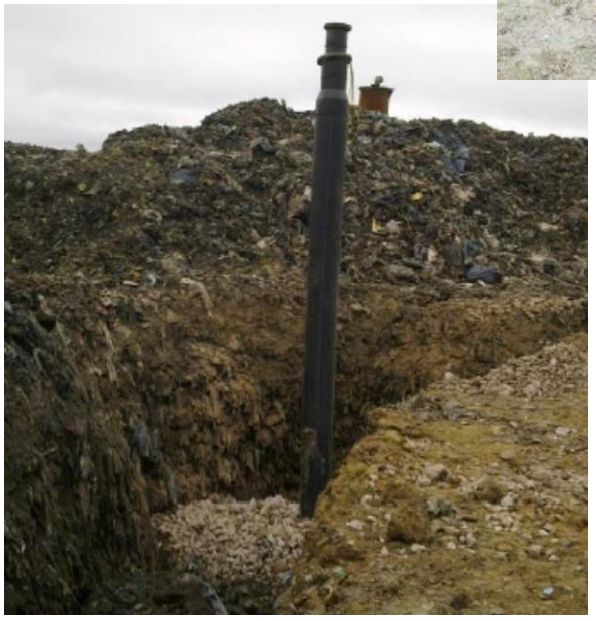
LANDFILL GAS

Landfill Gas Content	
Methane	**%45-70**
Carbondioxide	**%30-55**
Nitrogen	**%2-5**
Oxygen	**%0,1-1**
Ammonia	**%0,1-1**
Sulphur	**%0-1**
Water Vapor	**%1-3**

LANDFILL GAS
APPLICATION

GAS COLLECTION SYSTEM
Horizontal Well Structure

Maximum well depth 45 m.
Diameter of well impact 50 m



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GAS COLLECTION SYSTEM
Horizontal Well Structure

Maximum well depth 45 m.
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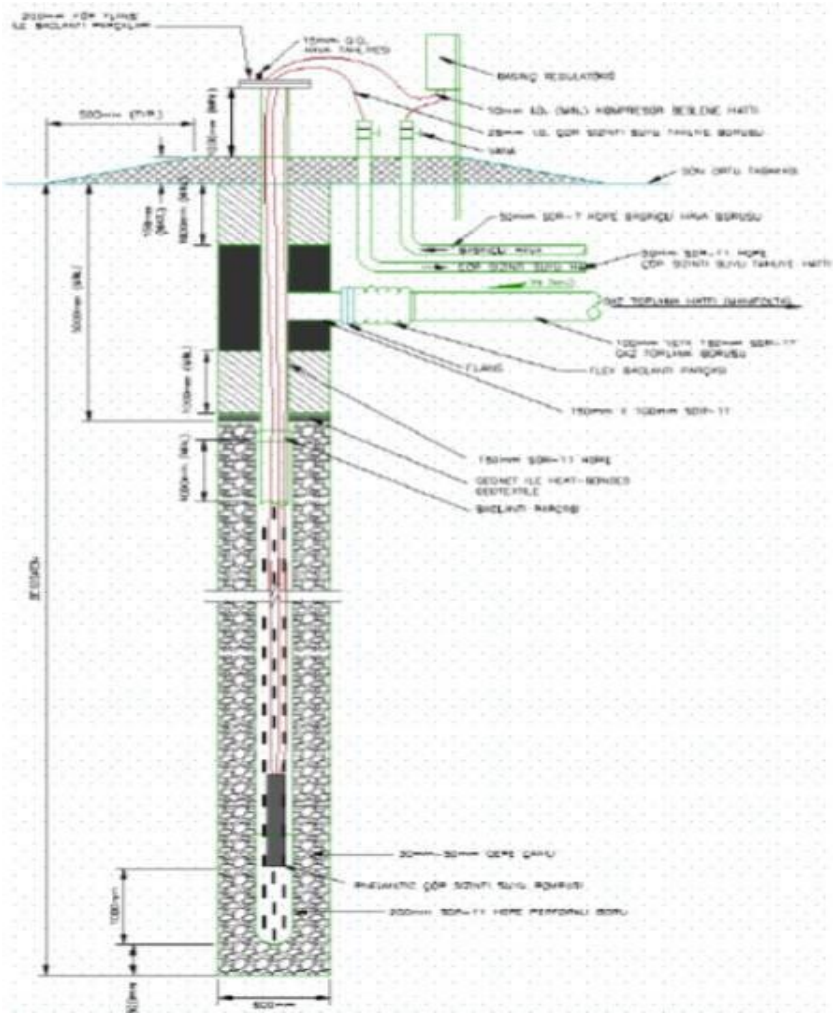
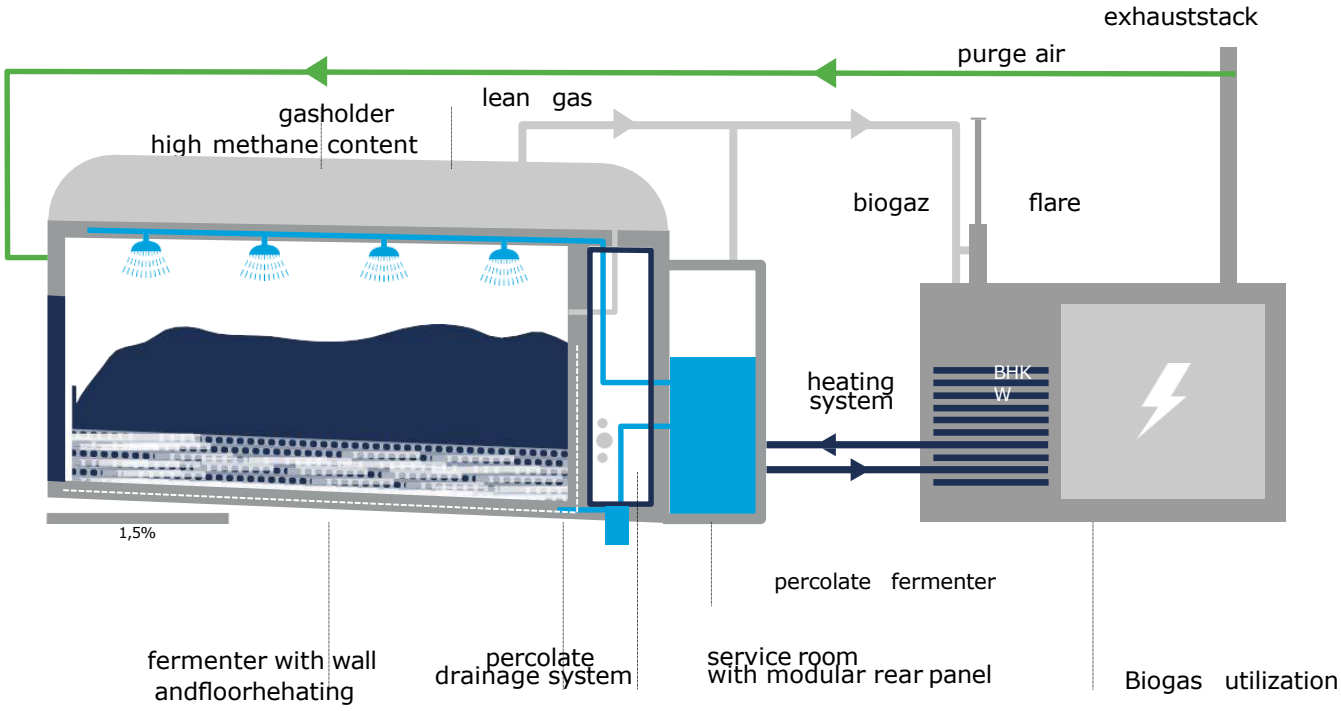


LANDFILL GAS
APPLICATION

DRY

FERMETATION



1. Wet system:

Biomass is turned into soup, soup is digestedin a stirred tank reactor.

Dry solids in reactor 5-12%
Continuous System

2. Semi - dry system:

Biomass is more like sludge, digested in a plug-flow reactor.

Dry solids in reactor 10-20%
Continuous System

3. Dry system:

Biomass is solid, digestedin a tunnel without diluting.

Dry solids in reactor 20 - 40%
Discontinuous system (Batch Process)

DRY

FERMETATION

Natural process which takes place in swamps.

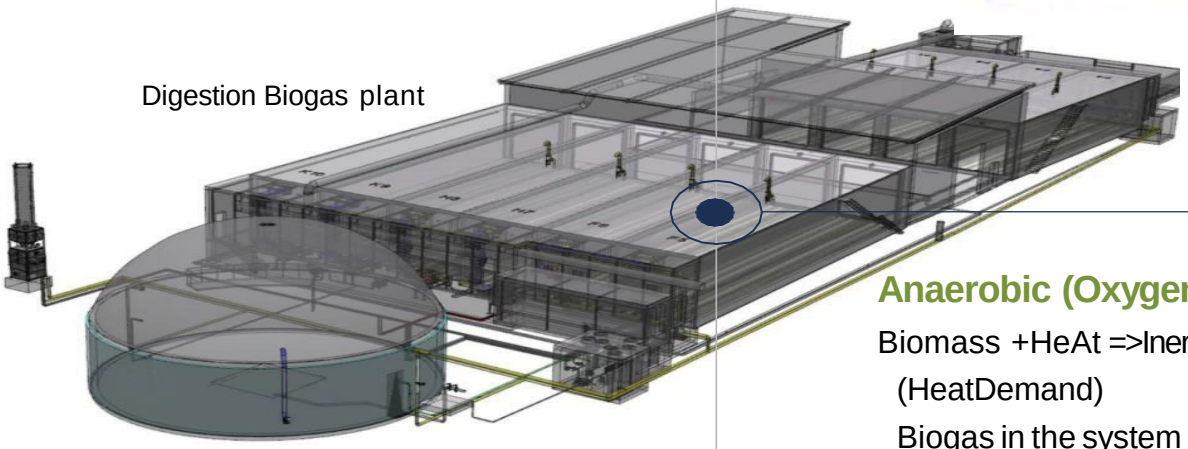
Recognized by the fermenter tank ("big balloon")

Different words for the same process:

Anaerobic digestion plant (AD plant) Fermentation

01

Digestion Biogas plant



02

Anaerobic (Oxygen <1%)

Biomass +HeAt =>Inerts+ CH4 + CO2 Endotherm (HeatDemand)

Biogas in the system (Explosive) 3 –4 Weeks Duration

End Product =digestate(no compost!)

Lignin not decomposed

03

Optimal DRY AD Process Parameters:

Filling the tunnel Optimal filling by Loader

Temperature 37 -42ºC

Oxygen Concentration

<1%Humidity 60-70 % pH 7-8

Waste Composition 0,65 T/m3

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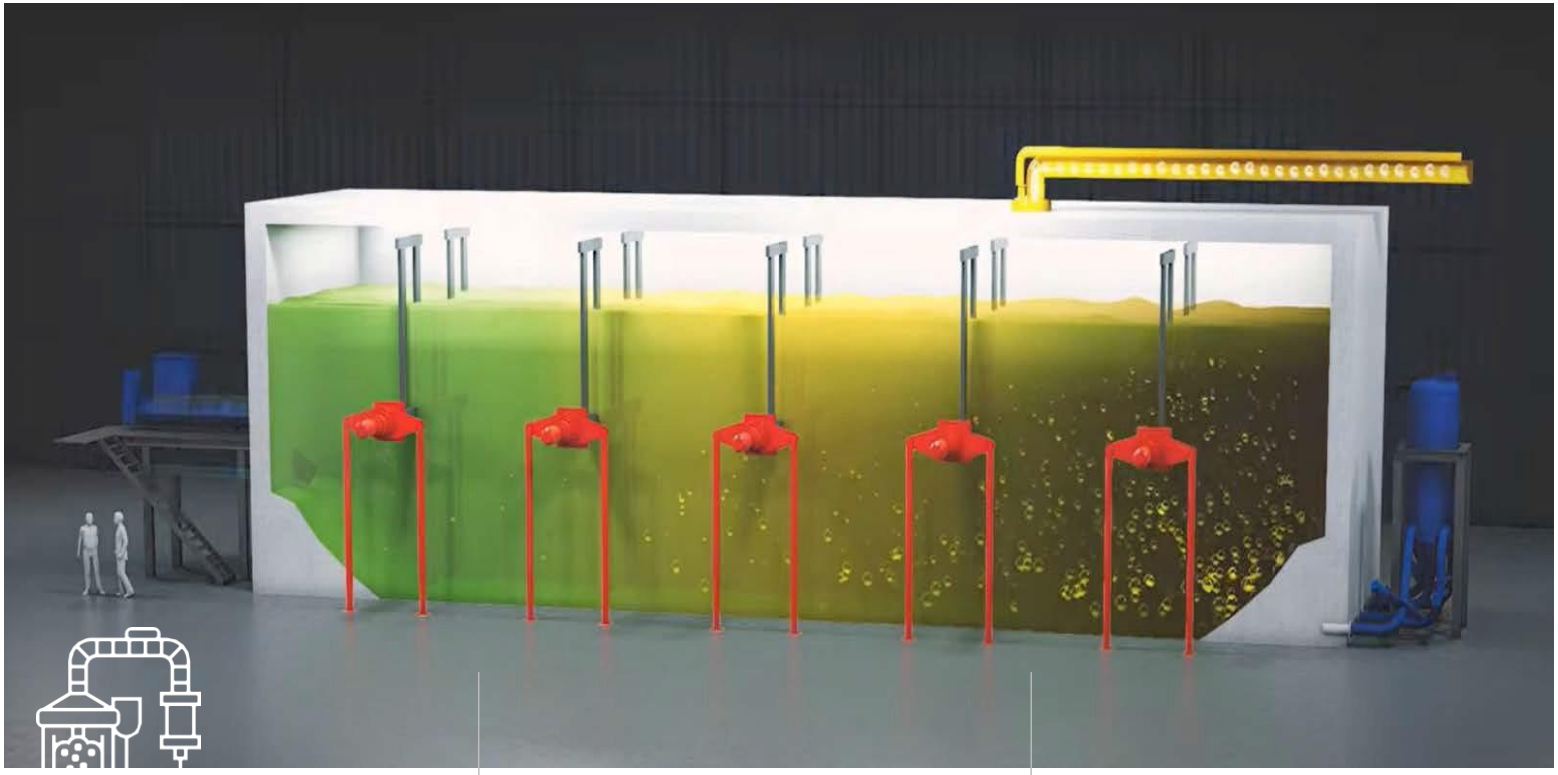

DRY

FERMETATION

The organic waste which is gained by waste separation plant is fed directly to the fermenter with the screw conveyor

The waste fed to the fermenter is mixed and heated in the fermenter to produce biogas.

Biogas is converted into electricity and heat energy in the CHP unit

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DRY

FERMETATION

The following features characterize composting:

Aerobic (Oxygen >8%) Biomass +Oxygen

Exotherm (heat production) Air in the system

2-8 Weeks process duration End product

=Compost

Lignin (woody material) is decomposed

COMPOSTING

Conversion of organic material towards a stable, Inactive product.

COMPOSTING

Types of composting systems:

1.Windrow (aerated pile) **2.Tunnel (in-vessel)**

Tunnelsystem

(in-vessel composting)

because:

1. Control of allparameters
2. Shortest processingtime
3. Control of allemissions
4. Lowest possible footprint using a spigot aeration system
5. Internal recycling of air for maximum process control while maintaining the building in negative pressure
6. Automated water spraying for moisture control
7. Low staff exposure to contaminated air

CRITERIA	IN-VESSEL COMPOSTING	AERATED PILE
Footprint	+	+/-
Reliability	+	+
Odor Control	+	+/-
Working Conditions	+	+/-
Process Control	+	-

COMPOSTING

Composting Phase: “Hygienization”

To eliminate pathogens and weed seeds

Necessary to make quality compost from food waste

Toeliminate pathogens and weed seeds

Necessary to make quality compost from food waste

Composting Process Parameters:

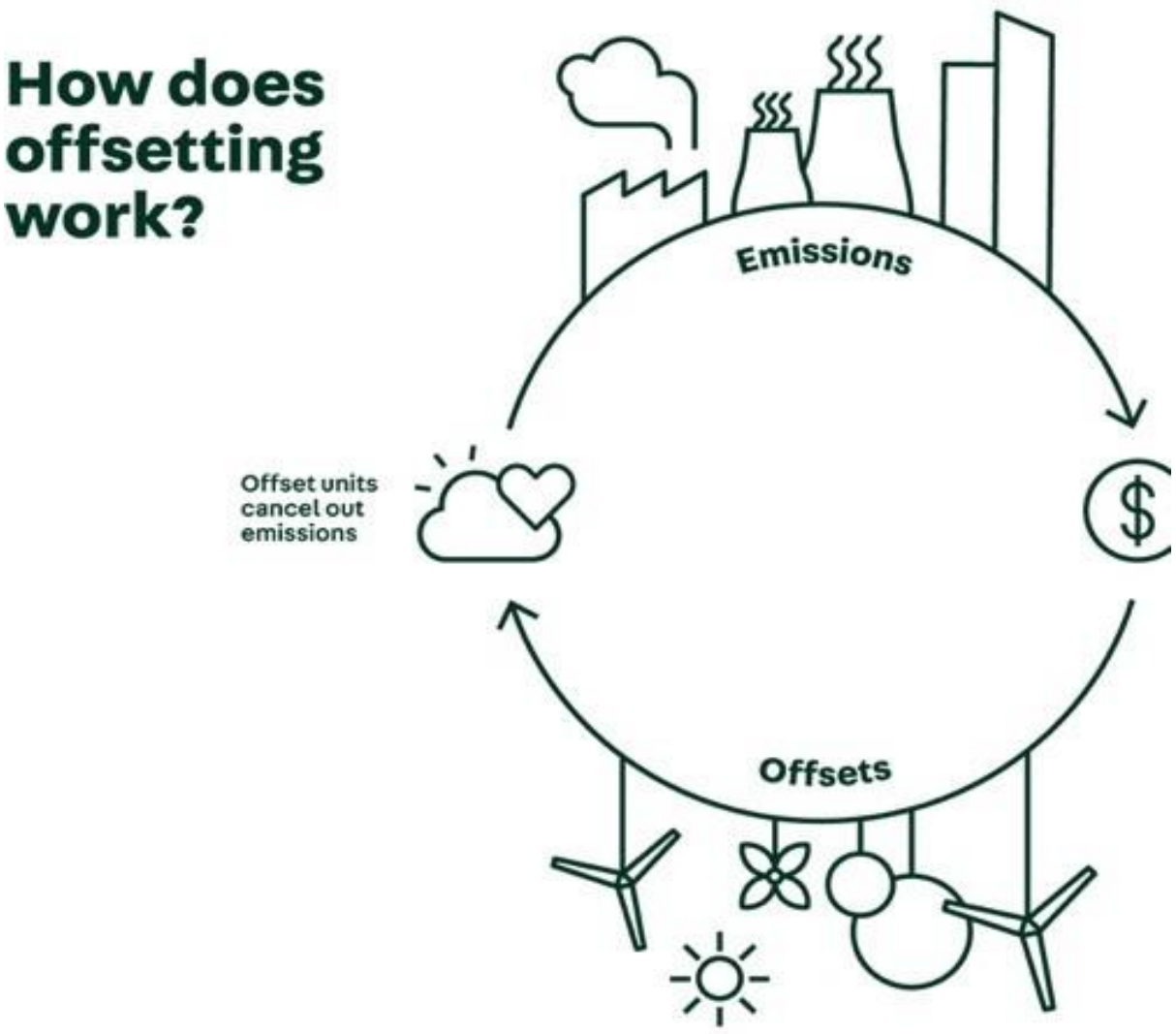
1. Composting temperature 52 ºC
2. Oxygen control 12-21%
3. Humidity(water) control 40 - 60%

   Optimal setpoints= Responsibility operators

   Software =Responsible for maintaining these setpoints
4. Density(filling/mixing tunnel)0,6 –0,65 T/m3 Human

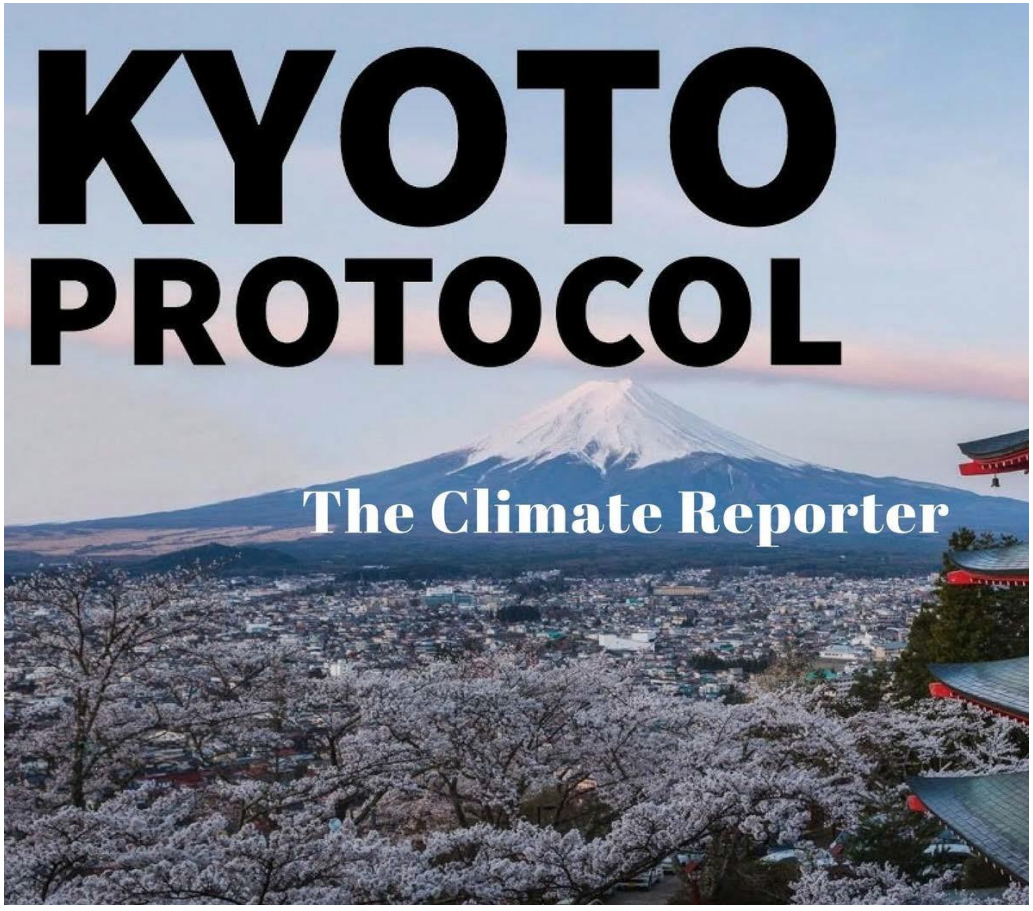
   operation =Responsibility operators

CARBON CREDITS



Carbon credit systems are additional financial incentive mechanisms planned to be implemented in developing countries. It aims to make emission reducing/preventing projects economically viable, which are normally not economically viable.

FLEXIBILITY MECHANISMS



1 ton of emissions created in New York and 1 tonne of emissions created in Rome are equivalent in terms of their impact on the climate crisis.

MARKET INSIGHTS

Global carbon markets value surged to record $851 bln last year-Refinitiv

By Nina Chestney

LONDON, Jan 31 (Reuters) - The value of traded global markets for carbon dioxide (CO2) permits grew by 164% to a record 760 billion euros ($851 billion) last year, analysts at Refinitiv said on Monday.

Most of the increase came from the European Union's Emissions Trading System (EU ETS), which launched in 2005 and is the world's most established carbon market.

It accounted for 90% of the global value at 683 billion euros, the annual Refinitiv Carbon Market Year in Review showed.

The annual trade volume of global carbon markets reached $851 billion in 2021.

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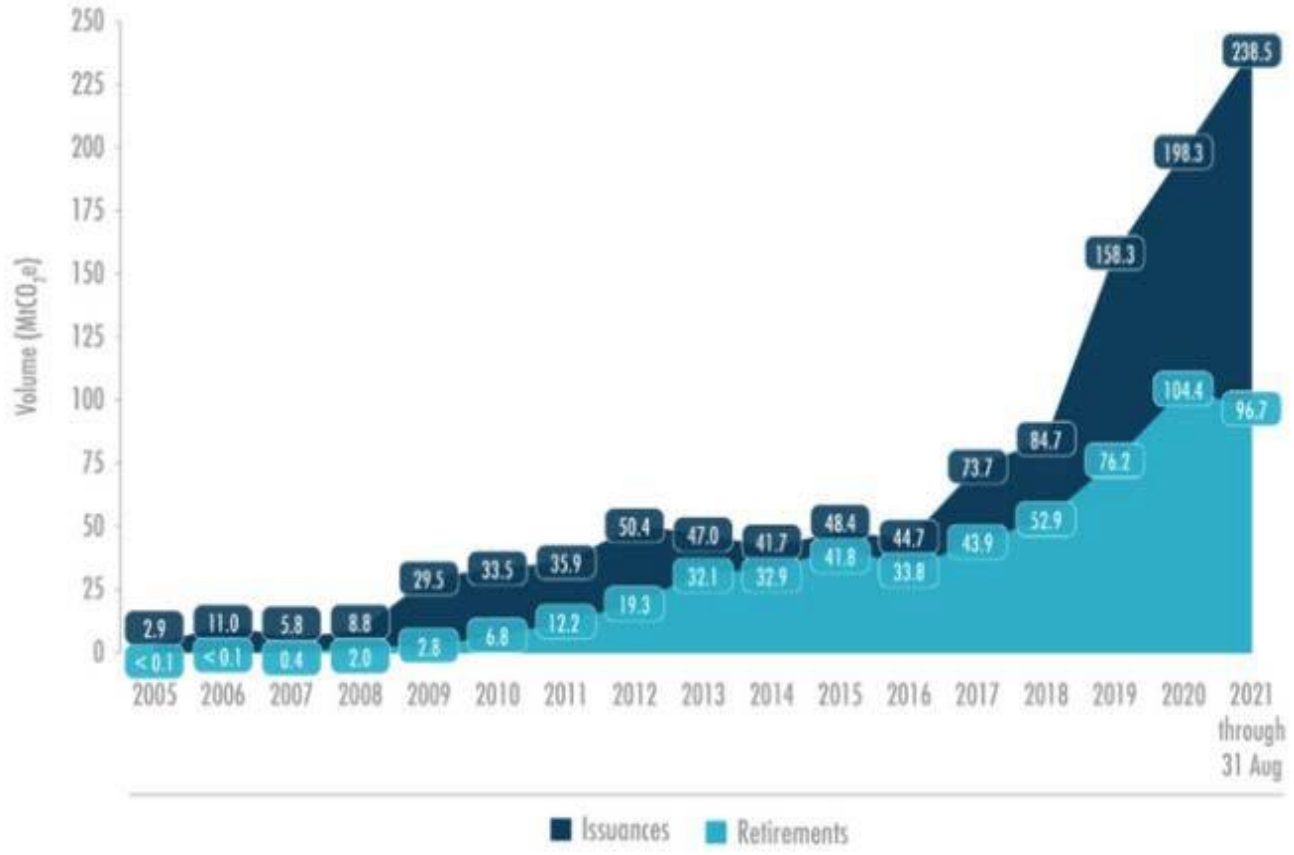
MARKET INSIGHTS

Figure 3. Market Size by Voluntary Carbon Offset Issuances and Retirements, 2004 to 31 August 2021



Source: *Ecosystem Marketplace, a Forest Trends Initiative.*

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MARKET INSIGHTS

Table 4. Voluntary Carbon Market Size by Project Category, 2019 - 31 August 2021

	2019			2020				2021 (through August)			
	Volume (MtCO2e)	Price per ton (USD)	Value (USD)	Volume (MtCO2e)	Volume % Change from Prior Year	Price per ton (USD)	Value (USD)	Volume (MtCO2e)	Volume % Change from Prior Year	Price per ton (USD)	Value (USD)
FORESTRY AND LAND USE	36.7	$4.33	$159.1M	48.1	30.9%	$5.60	$269.4M	115.0	139.4%	$4.73	$544.0M
RENEWABLE ENERGY	42.4	$1.42	$60.1M	80.3	89.4%	$0.87	$70.1M	80.0	-0.3%	$1.10	$88.4M
ENERGY EFFICIENCY/ FUEL SWTICHING	3.1	$3.87	$11.9M	31.4	921.0%	$1.03	$32.3M	16.1	-48.9%	$1.57	$24.2M
AGRICULTURE	-	-	-	0.3	-	$9.23	$2.8M	3.4	876.8%	$1.36	$4.6M
WASTE DISPOSAL	7.3	$2.45	$18.0M	8.3	13.0%	$2.76	$22.9M	2.7	-67.5%	$3.93	$10.6M
TRANSPORTATION	0.4	$1.70	$0.7M	1.1	165.2%	$0.64	$0.7M	2.1	99.3%	$1.00	$2.1M
HOUSEHOLD DEVICES	6.4	$3.84	$24.8M	3.5	-45.4%	$4.95	$17.3M	1.8	-49.8%	$5.75	$10.4M
CHEMICAL PROCESSES/ INDUSTRIAL MANUFACTURING	4.1	$1.90	$7.7M	1.3	-68.7%	$1.90	$2.5M	1.1	-11.2%	$3.22	$3.5M

Source: *Ecosystem Marketplace, a Forest Trends Initiative.*

Annualy between 10.000-20.000 tons carbon credits produced at landfill facilities.

At the 5.5 MW landfill facility, 55,000 tons of carbon credits are issued annually.

This means a carbon credits income 300,000$ on average of approximately per year.