



Integrated waste cycle

Granarolo dell'Emilia Plant Site

Waste to Energy Plant - Frullo Energia Ambiente Srl (a company of Herambiente SpA)

Selection and Recovery Plant - Herambiente SpA



Selection and recovery plants

Herambiente Group: selection and recovery plants



District centers (COREPLA)



		Traitment annual capability (t)	Manual Lines	Optical Lines
Coriano (RN) Plant		96.000	2	1
Mordano (BO) Plant		67.500	1	//
Voltana (RA) Plant		90.000	1	1
Modena Plant		130.000	1	1
Ferrara Plant		90.000	//	1
Granarolo dell'Emilia (BO) Plant		100.000	//	2

Traitment lifecycle

Plants activities overview:

Automatic selection and recovery,

Made by specific installations:

- ✓ Feeders and bag-openers
- ✓ Revolving sievers
- ✓ Ballistic sievers
- ✓ Ferrous and non ferrous recovery
- ✓ Optical readers

Manual selection and recovery,

Sometimes done whit mechanical equipments (grabs) or on subsidiary conveyors;

Volumetric reduction,

Hydraulics press.

The specific technology chosen depends on:

- ✓ Mono/Multimaterial collection
- ✓ Not recoverable fractions percentage
- ✓ Plant technologies available

Latest plants revampings allowed us to trait a large amount of wastes from separate collections thanks to the optical sorters installed in our plants



Automatic selection

In automatic separation cycles, in order to increase the recovery efficiency, some preliminary activities are mandatory; wastes need to be separated depending on:



SIZE → REVOLVING SIEVER

- ✓ Big sized fractions (>350mm), manually recoverable
- ✓ Average fractions (50-350mm), automatically selected
- ✓ Small sized fractions (<50mm), usually not recoverable



FORM → BALLISTIC SIEVER

Automatic separation on:

- ✓ Three-dimensional objects (3D): bottles, cans..
- ✓ Two-dimensional objects (2D): paper, textiles, plastic films..

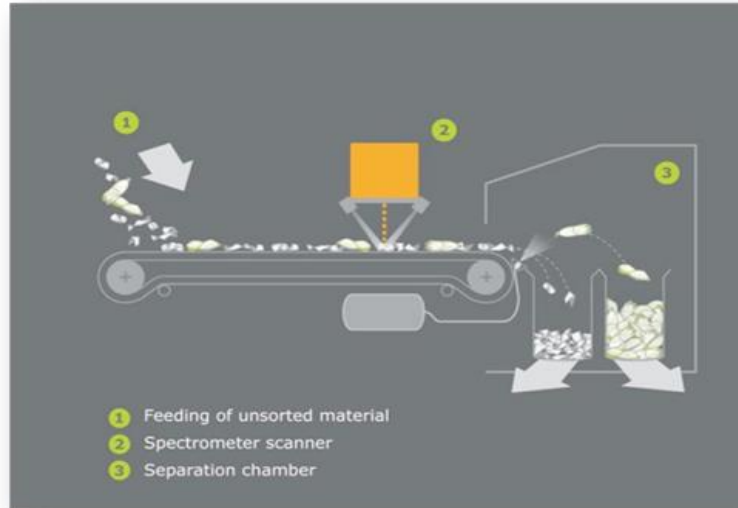
Optical sorters

Modern tools based on VIS (visible light) and NIR (near infra red) technologies to select different kind of polymers and colours.

The NIR spectrometer identifies different materials depending on specific and unique features of their spectrum (reflected light).

VIS recognizes materials depending on their chromatic features.

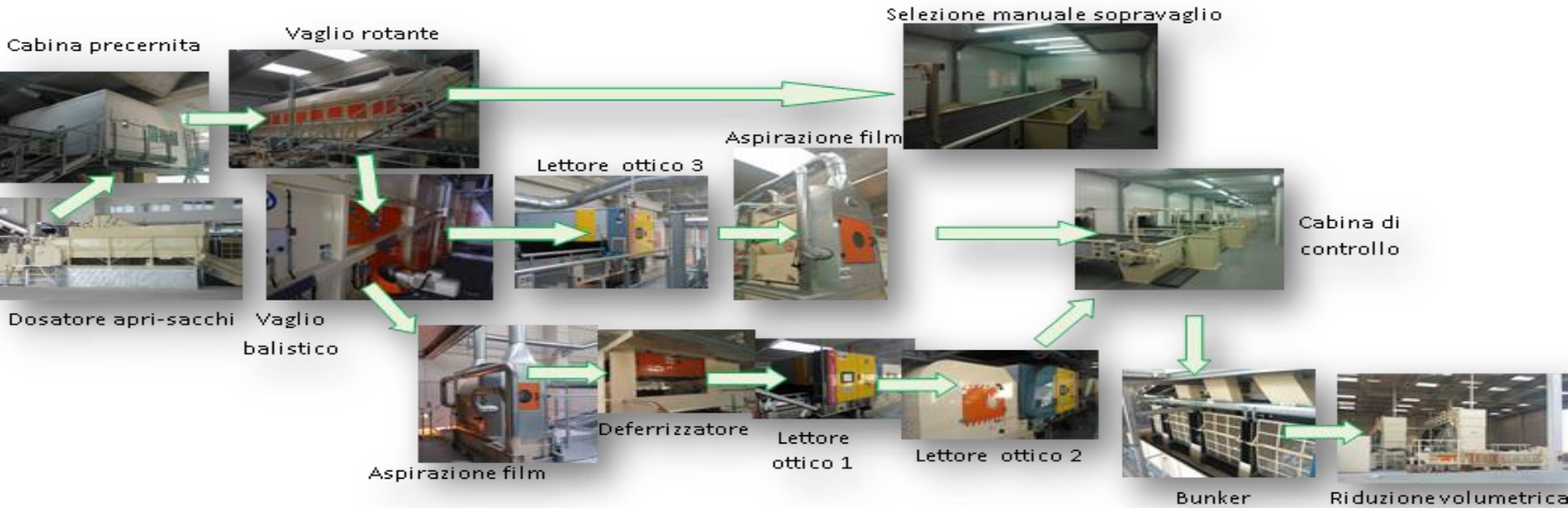
NIR and VIS technologies can be combined together.



Wastes arrive to the optical sorters in a homogeneous flow (1) and the optical sorters, depending on the specific set-up, can locate the exact position of each fraction that have to be recovered/rejected (2).

Once the position is detected, one of the two hundred compressed air valves is opened and the material is selected (3) by a blow of compressed air .

Automatic selection line: plastic line – Granarolo:



Average flow rate on plastic separate collection → 8 ton/hour

Subsequent destinations

The main purpose of selection and recovery plants is to put materials again in productive cycles:

- ✓ National recovery Consortium (CONAI, COMIECO, COREVE, RILEGNO, COREPLA, CIAL);
- ✓ Other recovery and recycling plants;
- ✓ WTE plants;
- ✓ Landfills.





Waste to Energy

WTE

■ **Beginning of the activity**

■ **Number of lines**

■ **Incinerating capacity**

■ **Thermal load**

■ **Maximum production of electrical power**

■ **Maximum production of heating power**

■ **Yearly working hours**



Ottobre 2004

2

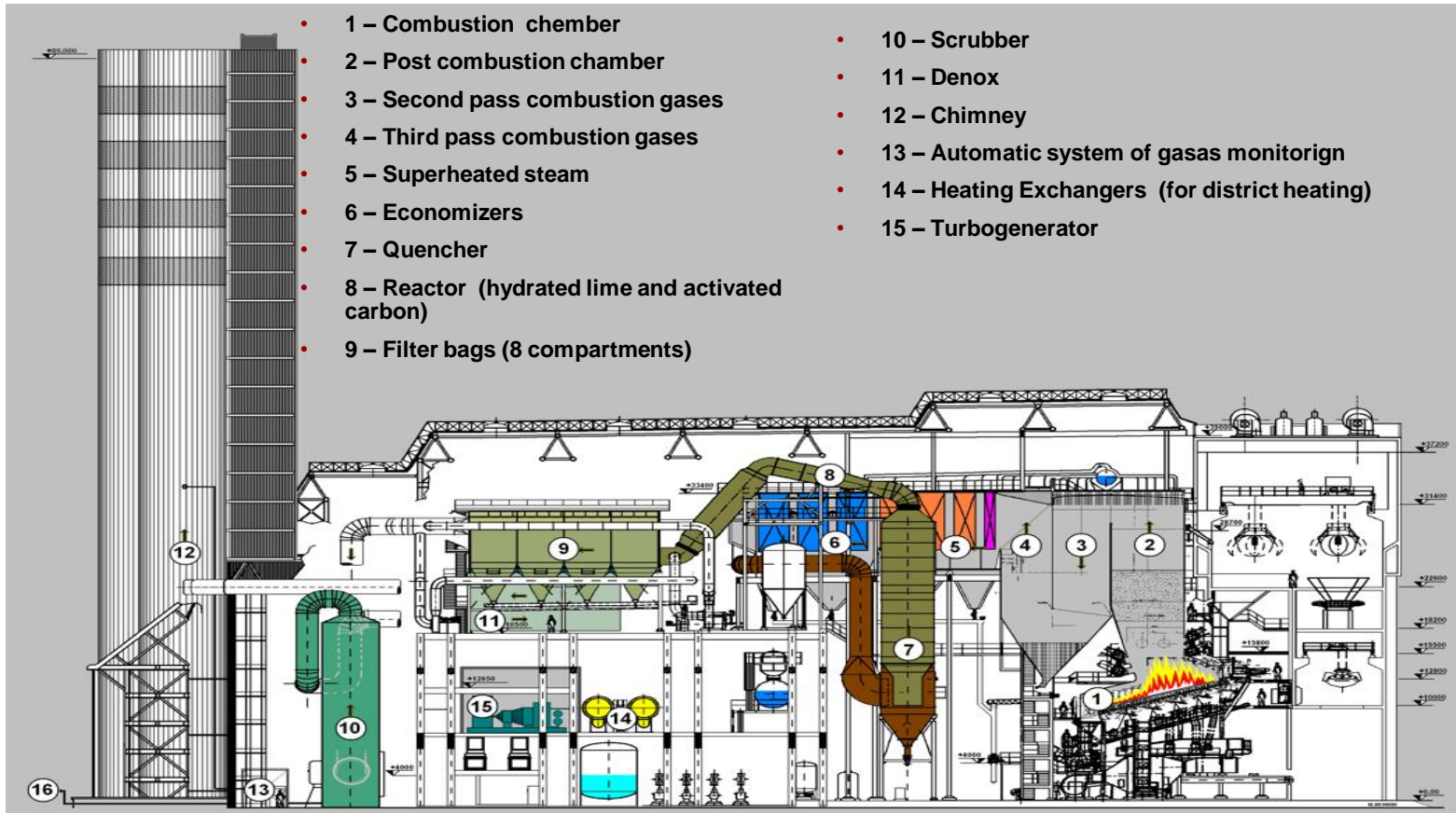
600 t/g con PCI 2800 kcal/kg

81,4 MW_t (70.000 Mcal/h)

24,5 MW_e

24 Gcal/h

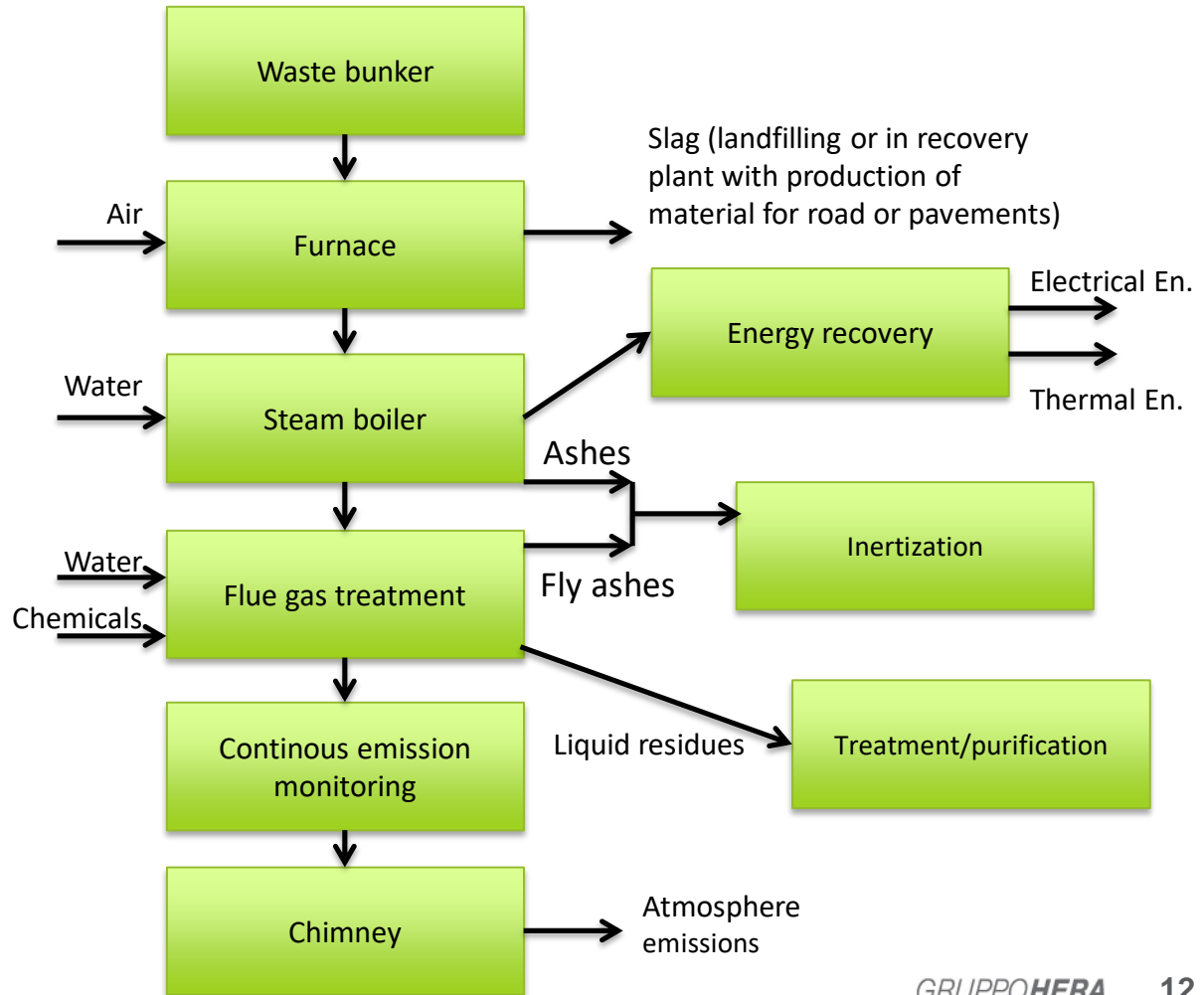
7500 – 7700



Process Flowchart

Residues coming from the WtE plant:

- **Slag (or Heavy/Bottom ash)** from the combustion chamber, mainly inert materials from the waste that does not take part in combustion, with low unburned material (1-3%). Classified (mainly) as special non hazardous waste;
- **Boiler ashes**, solid particles carried by the gas flow, depositing on the surface of the steam boiler, from which they are periodically removed. Classified as hazardous waste;
- **Fly Ashes**, (fine ashes and reaction salts) residues from the treatment stages carried by the flue gas, separated by means of filters. Classified as hazardous waste.



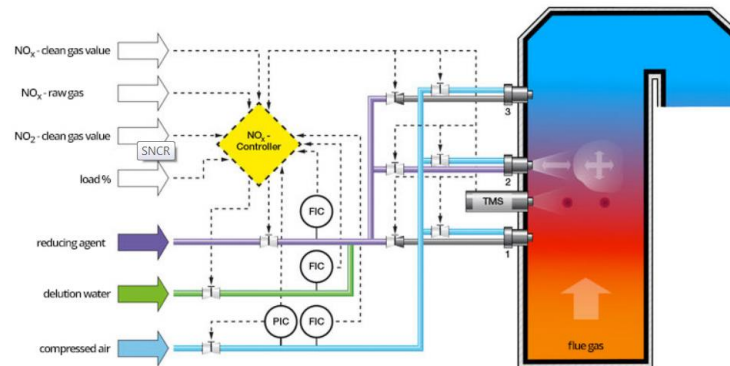
News

NEW INSTALLATION – 2018 2019

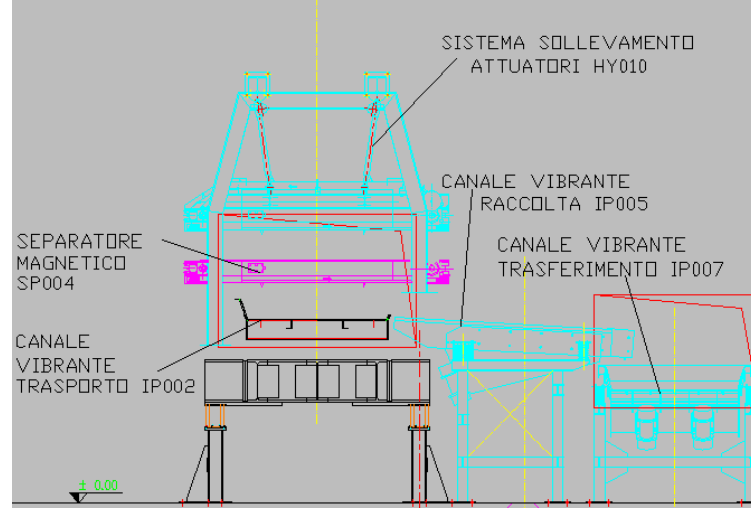
At the end of 2018 a non-catalytic system (SNCR) was installed in post combustion chamber in both line, for NOX reduction

ADVANTAGES

the SNCR system will be an additional system of gases purification for the NOX pollutant to guarantee more limit respect.



IRON SEPARATION SYSTEM



The bottom ashes from the combustion process goes from the grate to the slag cooling system, then an hydraulic pusher push the ashes inside a vibrating plane, in the terminal part of the plane there is a magnet that can capture the iron in the ashes.

The iron is divided and stored in a bunker and the ashes go in another bunker. It will be possible to collect 6% of iron from the total ammount of ashes.

WTE PLANT : 2018 DATA



TREATED WASTE

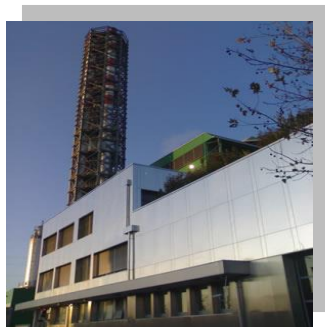
TREATED WASTE (tons) year 2018	208.861
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Electricity production	kWh	131.156.325	it is equivalent to family consumption	48.600
Termal Energy production	Mcal	49.386.021	it is equivalent to the consumption of heat necessary for heating homes	3.800

Fossil fuel Saved

The recovered energy (thermal and electrical) saves a quantity of fossil fuel equal to 22,389 TOE (tons of oil equivalent)

WHY THE WASTE TO ENERGY PROCESS?



If we take as a reference the FEA plant that insists on the Bologna area, we have the balance of greenhouse gas as shown below

	Year 2016	Year 2017	Year 2018
t CO ₂ eq. Emit	78.314	73.624	67.682
t CO ₂ eq. Prevent	114.501	115.994	113.057
NET BALANCE (*)	-36.187	-42.370	-45.374
Fattore di emissione (t CO ₂ eq. / t termov.) (**)	-0,17	-0,20	-0,22

(*) The annual greenhouse gas emissions balance is negative as the emissions prevented are quantitatively greater than the emitted

(**) The emission factor indicates the net quantity of emissions prevented for each ton of waste used in the plant

CERTIFIED SYSTEM MANAGEMENT



The management system of FEA waste-to-energy plant is developed according to the most important standards in terms of quality, safety and the environment: :

- UNI EN ISO 9001 “*quality*”
- BS OHSAS 18001 “*safety*”
- UNI EN ISO 14001 “*environment*”

In addition to being certified since 2002 according to the UNI EN 14001 standard, on 24 July 2009 FEA reached an important milestone represented by the EMAS Registration of the European Community.

RELATIONSHIP WITH THE POPULATION

In 2018, over 580 visitors visited our plant in 27 days, which constituted an important opportunity to approach and provide information on sustainable waste cycle management



The initial mistrust and perplexity, each time turning into appreciation of our work and in the belief that the waste-to-energy plant performs a useful service for the community and the environment



Società del Gruppo Hera

Thank you for your attention