

WASTE TO ENERGY



TYPES OF PLANTS

Hydroelectric



Solar



Coal-fire



Cogenerative and thermal



Waste-to-Energy



Integrated waste cycle

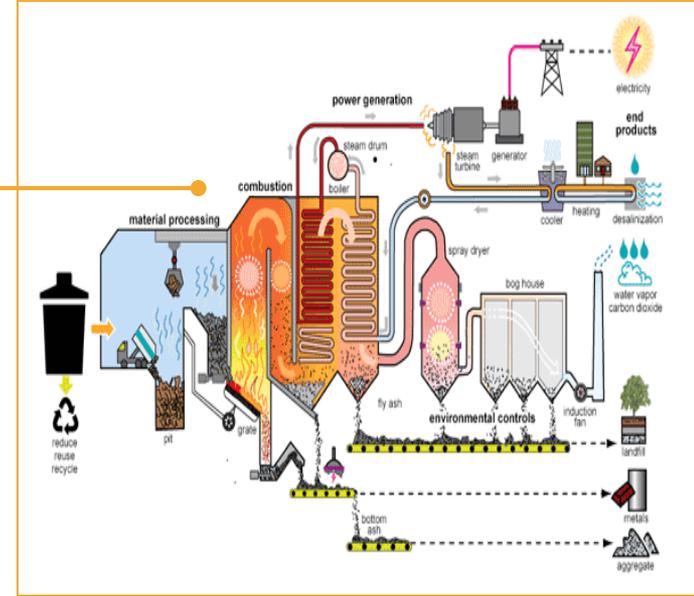




WASTE TO ENERGY

Waste-to-energy plants convert non-recyclable waste into alternative fuels and raw materials, by combustion.

By **non-recyclable waste** we mean materials that can no longer be recycled due to various technical and economic reasons.



WASTE AS A RESOURCE



First of all

Reuse, Reduce, Recycle

This is a necessary path to protect the environment, to reduce the exploitation of raw materials and also to save money.

In fact, managing waste has a cost not only in economic terms, but also in organizational terms. The most correct approach from all points of view is to **reduce production**.

What can each of us do?

WASTE AS A RESOURCE



-  **reduce waste:** trying to produce as little as possible and reusing materials, instead of throwing them away.
-  **use fewer raw materials** for the production of goods,
-  **adopt technologies and procedures that produce less waste;** in reducing or eliminating packaging and designing reusable products that can last a long time.

Consumers can contribute by adopting some virtuous behaviors such as favoring bulk buying or shopping with a jute or cotton bag from home.

ENERGY RECOVERY



Waste-to-energy (WtE) or **energy-from-waste** (EfW) is the process of generating energy in the form of **electricity or heat** from the primary treatment of waste, or the processing of waste into a fuel source.

WtE is a form of energy recovery.

Most WtE processes generate electricity and/or heat directly **through combustion**

ENERGY RECOVERY



The energy recovery of waste is carried out in plants with **high energy performance** and with **innovative flue gas purification systems**

In the **boiler**, the fumes derived from combustion gradually release their thermal energy, transforming the **water** into **superheated steam** which is sent to a turbine-alternator group for the production of **electricity**.



INCINERATION

Compared with other waste to energy technologies, **incineration** seems to be the most attractive due to its **higher power production efficiency**, **lower investment costs**, and **lower emission rates**.



Incineration provides the **highest amount of electricity** with the **highest capacity to lessen pile of wastes** in landfills through direct combustion.



INCINERATION

The method of incineration to convert municipal solid waste (MSW) is a **relatively old method** of WtE generation.

One problem associated is the potential for pollutants to enter the atmosphere with the **flue gases** from the boiler.

Modern incinerators incorporate carefully engineered primary and secondary burn chambers, and controlled burners designed to **burn completely with the lowest possible emissions**.

Case #1

A2A PLANT - BRESCIA



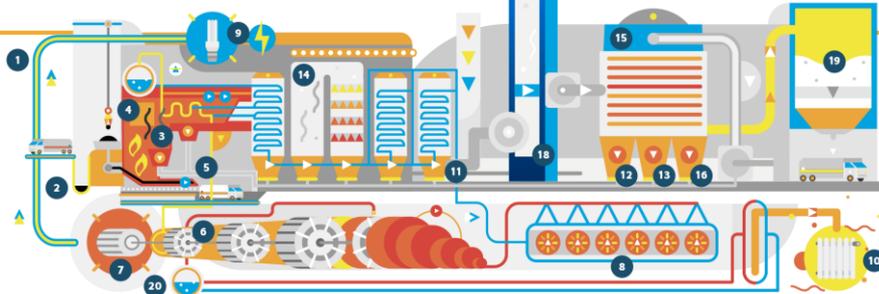
The plant started operation in spring 1998

HOW BRESCIA WtE WORKS

Collection, transfer, reception

From the collection and mixing pit, by overhead **bridge cranes**, the **waste** is loaded directly into the **hoppers** that feed the grits where combustion takes place.

- | | |
|---------------------------------|---|
| 1 Controllo e conferimento | 11 Scarico ceneri leggere |
| 2 Vasca rifiuti | 12 Carboni attivi |
| 3 Camera di combustione | 13 Calce idrata |
| 4 Caldaia | 14 catalizzatore abbattimento NOx |
| 5 Scarico scorie fondo griglia | 15 Filtro maniche |
| 6 Turbina a vapore | 16 Scarico polveri da depurazione fumi |
| 7 Generatore di corrente | 17 Camino |
| 8 Condensatore scarico vapore | 18 Controllo emissioni |
| 9 Energia elettrica | 19 Silo per stoccaggio e scarico ceneri e polveri |
| 10 Calore per teleriscaldamento | 20 Scambiatore vapore/acqua teleriscaldamento |

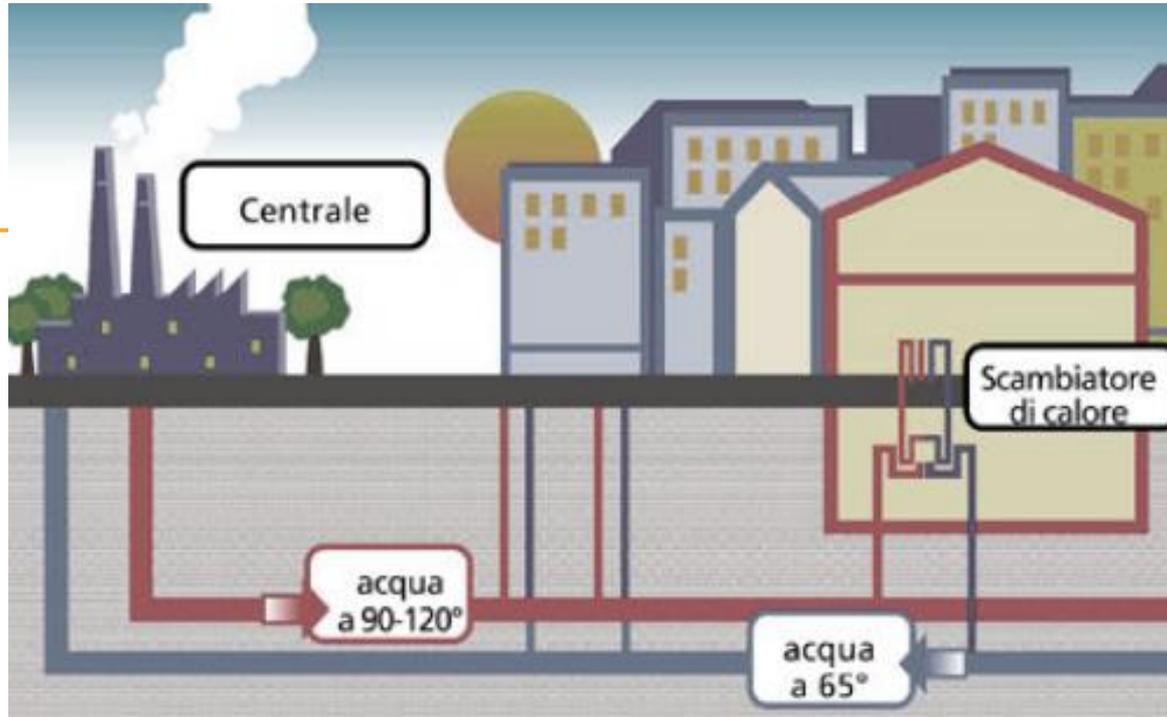


Combustion lines

It consists in **steam generators** equipped with moving grates with combustion chambers to allow **waste oxidation**.

POWER GENERATION & DISTRICT HEATING

High-pressure stream is injected into the turbine for **production of electrical energy** and used to **heat the water** that feeds the district heating network in the town.



CARE FOR THE ENVIRONMENT

Flue gas treatment begins in the boiler with injection of ammonia and subsequent break-down of the nitrogen oxides in the **high-dust catalyst**.

The flue gases come to the purification and filtration system for the **removal of micropollutants**.

The **cleaned flue gas** goes through "fabric filters" that trap all the suspended dust and are then **conveyed to the chimney**.



TREATMENT OF PROCESS RESIDUALS

All rejects from plant processes are recovered.

Ferrous metals are separated on site from the heavy bottom grid ashes, while the remaining fraction is recovered in external plants as materials for cement industry.

The dust retained by the filter is collected in special storage bins and sent for recovery in appropriate final treatment plants.



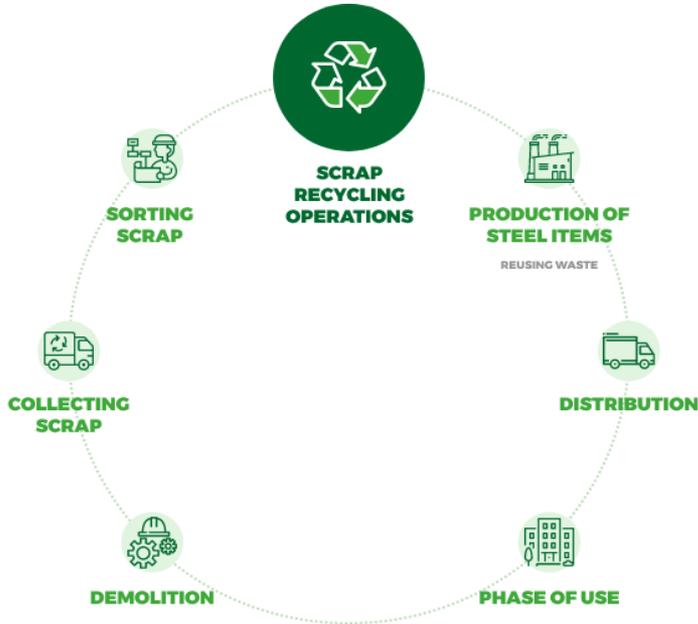
Case #2

FERALPI - LONATO

Feralpi is a major European manufacturer of reinforcing steel. It was established in 1968



CARE FOR THE ENVIRONMENT



Steel is the most recycled material in the world: it can be reused any number of times without losing its intrinsic characteristics.

Feralpi provide an example of a **circular economy**, as the company produce **steel from scrap**, in order not to spread them in the environment and reducing the consumption of natural raw materials (e.g. iron ore) to produce new steel.

The steel produced by Feralpi is 93.4% recycled material

ENERGY RECOVERY



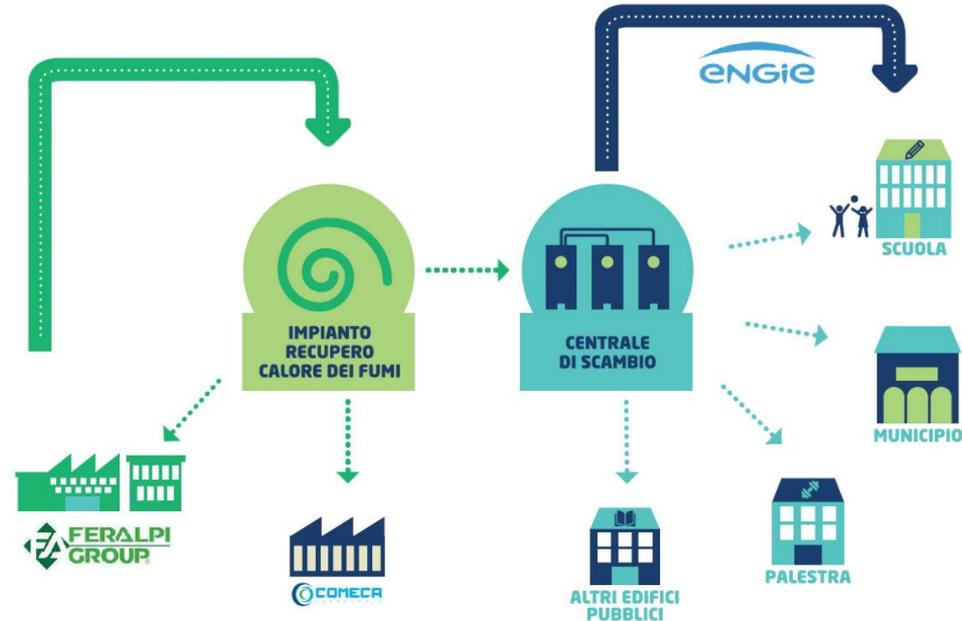
In recent years it has been possible for Feralpi Siderurgica to **recover the heat from cooling water of steel works**, avoiding its dispersion into the atmosphere.

The **heat recovery plant from steelworks fumes** in Lonato, generates steam which is partly used for **electricity generation**.

INNOVATION AND FUTURE

Through **waste heat recovery**, Feralpi Siderurgica has created a plant interfacing directly with the **cooling system of the melting furnace fumes** that supplies heat to a distribution hydraulic circuit about **one kilometer** long and delivers **4 mwt** at an operating temperature of **90°C**.

Since 2019, with the heat of the steel mill, it has been possible to heat **public buildings and some private buildings** in the municipality, in collaboration with the local administration.



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