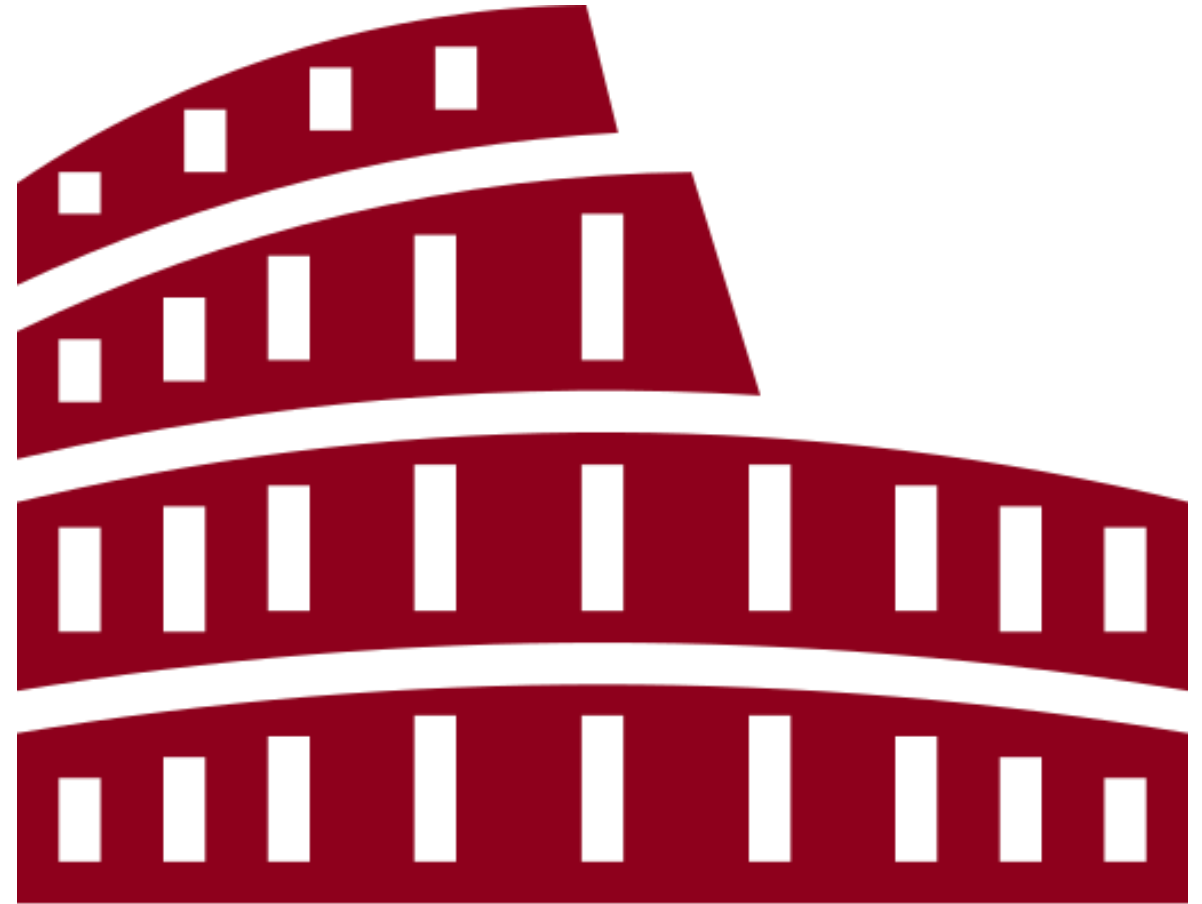




# **“Strategy, investment plan and criticalities for WtE in Rome”**

1. **WtE Italy Normative Context**
2. **WtE National Waste Management Plan**
3. **WtE Data Italy**
  - **WtE plants**
  - **Biodigestors and integrated digestors**
4. **WtE in Rome**
  - **Critical Timeline Waste Management**
  - **Waste Management Plan**
    - **LCA**
  - **WtE Plant**
    - **Expression of interest**
    - **Technical characteristics**
  - **Biodigestors**
5. **Conclusions**







European Union law

The **treatment of waste, specifically its conversion into energy**, is strictly regulated by **European Union laws**.

---

Industrial Emissions  
Directive 2010/75/EC



All new installations should ensure full compliance with EU legislation for incineration and co-incineration facilities with the **Industrial Emissions Directive 2010/75/EC**.

---



National Waste  
Management Plan

The **National Waste Management Plan**, introduced by the implementing decree 116/2020 of the UE directive 2018/851, defines the macro-goals and strategies that will allow to **reach the european targets in the waste field**.

---

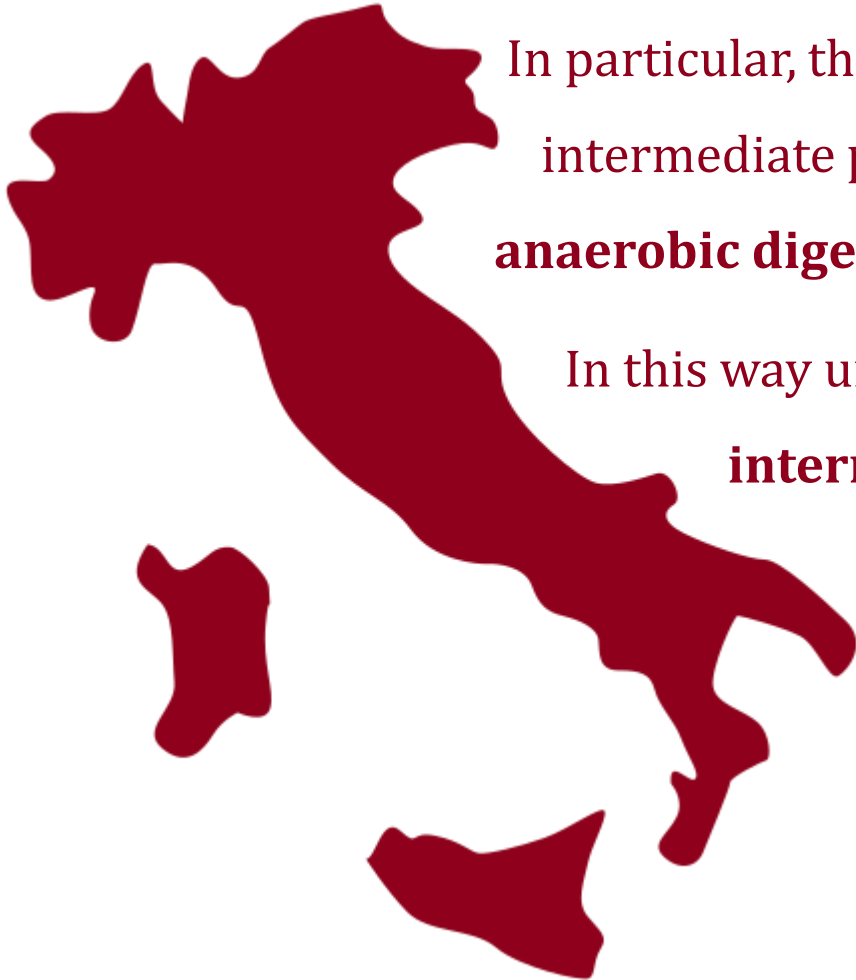
Requirements for  
the energy recovery



The National Waste Management Plan **sets the plant requirements for the energy recovery** from municipal waste at national level.



The National Waste Management Plan aims at **filling the uneven distribution of plants between north and south** that currently characterizes Italy (**plant gap**).



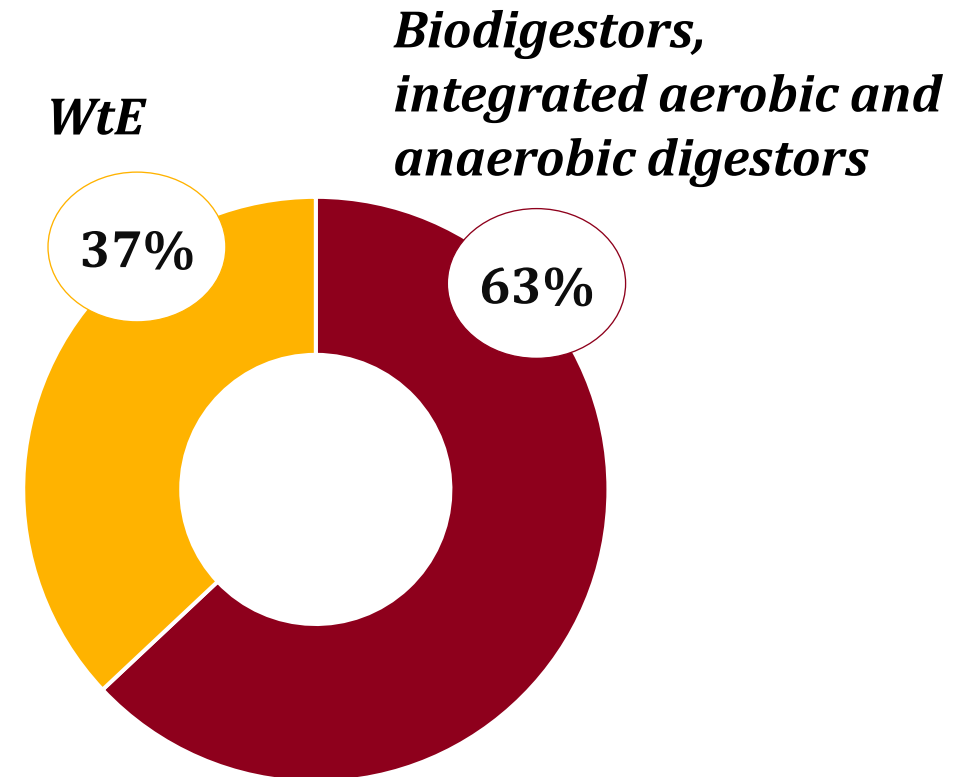
In particular, the **Rome Waste Management Plan** envisages the removal of intermediate plants concurrently with the construction of a **WtE plant** and **two anaerobic digestion plants**.

In this way unsorted waste would be directed straight to WtE plant, **without the intermediate plant phase**.

A new efficient way of managing waste is fundamental in the years to come since the **percentage of waste sorting is expected to be higher**, so there will be more differentiated waste to manage.

In Italy there are  
**37 WtE plants and 63  
biodigestors, integrated  
aerobic and anaerobic  
digestors, distributed  
unevenly across the country  
(2021 data).**

*WtE plants, biodigestors, integrated aerobic and anaerobic digestors plants, year 2021 (Source ISPRA)*

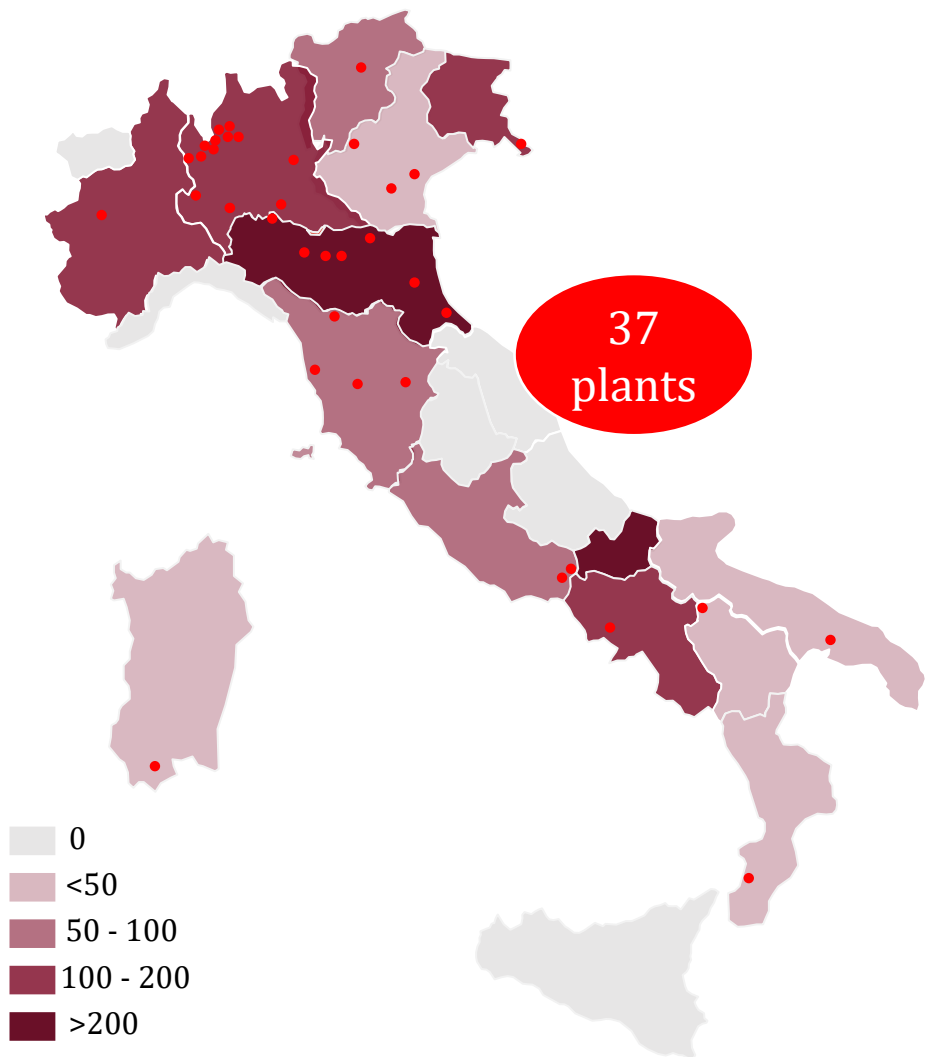


The large number of these plants is **located in north Italy**, leading to a **plant gap situation between north and south.**

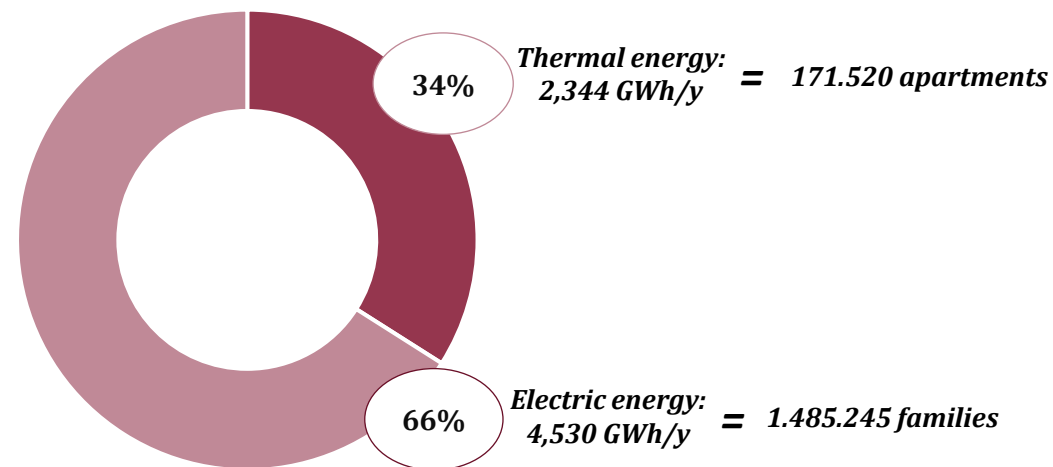
# WtE Data Italy: WtE plants



Dislocation and numerosity of plants and incineration per capita, year 2021 (Source ISPRA)



Electric and thermal energy produced in 2021 (Source Ispra)



Incinerated waste per region area (t), year 2021 (Source ISPRA)

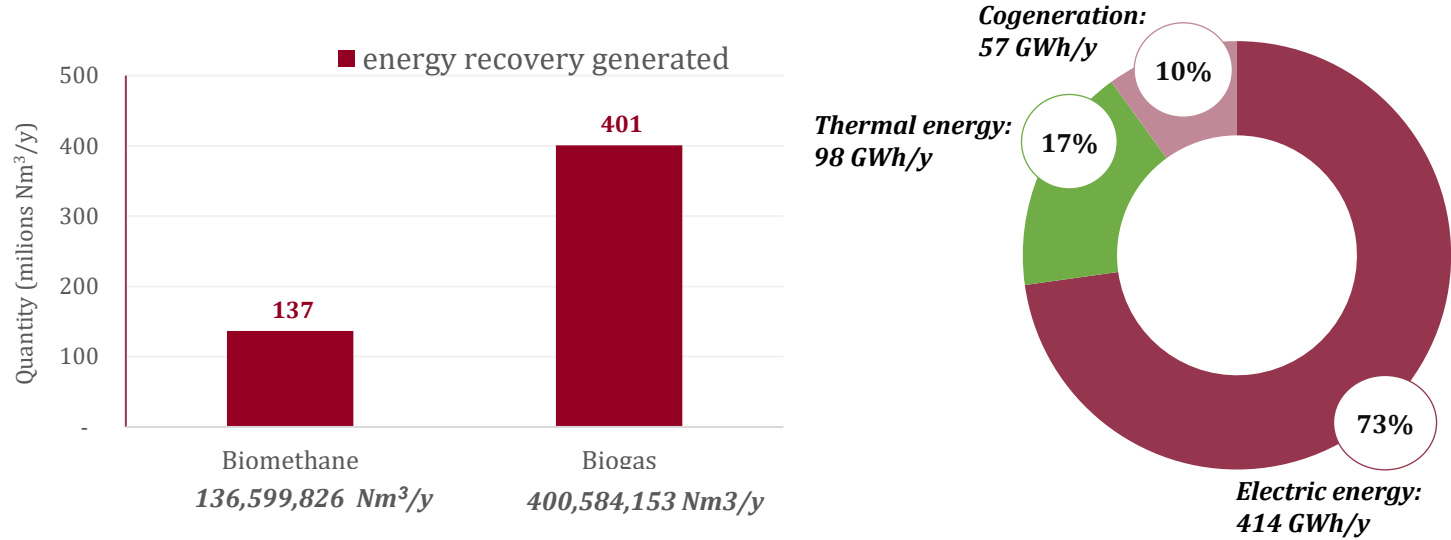
Region area	N. Operating Plants	Total MW	Total waste	% regarding MW produced
North	26	3,869,124 t	4,472,376 t	29,2 %
Centre	5	526,804 t	527,104 t	10,4 %
South	6	1,013,556 t	1,066,700 t	16,0 %
Italy	37	5,409,484 t	6,066,180 t	21,9 %

# WtE Data Italy: Biodigestors and integrated digestors

Dislocation and numerosity of anaerobic digestors and integrated aerobic/anaerobic digestors plants (Source ISPRA)



Production and energy recovery produced in 2021 (Source ISPRA)



Anaerobic digestors and integrated aerobic and anaerobic digestors of waste per region area (t), year 2021 (Source ISPRA)

Region area	N. Operating plants	Authorized Quantity (t)	Total waste treated (t)
North	47	4,249,943	3,713,740
Centre	7	448,500	311,455
South	9	407,053	273,524
Italy	63	5,105,496	4,298,719

# WtE Rome: Critical Timeline Waste Management

ROMA



## Closure of Malagrotta Landfill

October 1°, 2013

Since the closure of the Malagrotta landfill, Rome no longer has a final destination for the unsorted waste.

## Emergency Situation

2014 – 2021

During these years, waste was sent to plants located either outside the city, the region or even the country.

## Appointment Extraordinary Commissioner

4 February 2022

Due to a decree of the President of the Republic, the Mayor of Rome Roberto Gualtieri has been appointed Extraordinary Commissioner, due to the celebration of Catholic Church's 2025 Jubilee, taking place in Rome, Gualtieri has been granted with competences regarding the field of waste management to Law No. 91 of 15 July 2022.

## Rome Waste Management Plan

1 December 2022

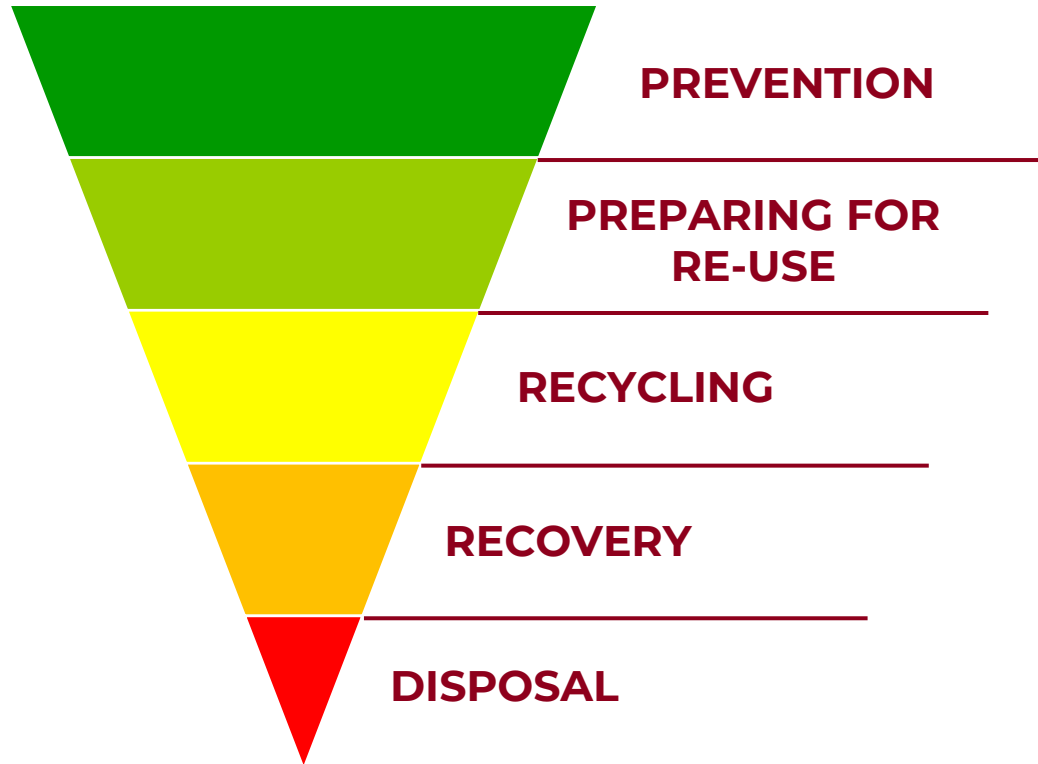
Final approval of the waste management plan of Rome at the head of the Extraordinary Commissioner .

The Plan has the following time horizon: 2022-2030.



Rome Waste Management Plan needs to **follow the directions** of the national plan.

In this context **WtE results fundamental**, in combination with good practices such waste sorting and substitution of landfill (**waste hierarchy**).



The Rome Waste Management Plan, focused on the **time horizon 2022-2030**, acts on the treatment plant classification whose realization is envisaged by the plan itself in the municipality area.

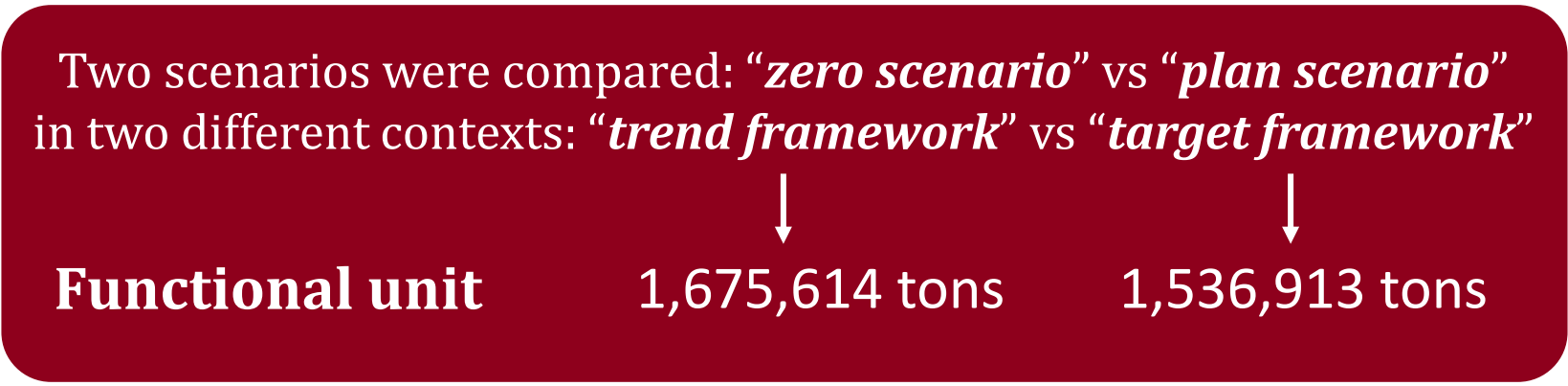
According to the plan **it will be realized:**

- **2 anaerobic digestion plants** authorized to treat 100.000 t/y each (total amount of **200.000 t/y**);
- **1 WtE plant** with direct energy recovery from residual unsorted waste, authorized to treat **600.000 t/y**.

*(source: Rome Waste Management Plan)*

# WtE Rome: Waste Management Plan - LCA

A life cycle assessment (LCA) has been conducted in order to understand the environmental impact of having a **WtE plant and biodigestors** in Rome. According to the conducted LCA ,the management of waste through these new plants will cause a drastic reduction of the environmental impact.



Two scenarios were compared: “*zero scenario*” vs “*plan scenario*”  
in two different contexts: “*trend framework*” vs “*target framework*”

**Functional unit**

1,675,614 tons

1,536,913 tons

The **functional unit** of this LCA study is given by the total quantity of waste generated in the area of Rome in 2030, whose management is followed up to the recovery of matter, energy or final disposal.



The **zero scenario** describes the plant situation of 2022. In order to make a comparison with the plan scenario, the zero scenario has been modified predicting the achievement of the goal of 65% waste sorting, with the same goals assigned to "plan scenario".

Two scenarios were compared: **zero scenario** vs "plan scenario" in two different contexts: "*trend framework*" vs "*target framework*"

**Functional unit**

1,675,614 tons

1,536,913 tons

The **plan scenario** envisages that the criticalities detected for the collection operations and management phases of the current management system (state of affairs) of waste will be exceeded reaching the objectives and realizing the actions specified by the plan.

Two scenarios were compared: “*zero scenario*” vs “*plan scenario*”  
in two different contexts: “*trend framework*” vs “*target framework*”

**Functional unit**

1,675,614 tons

1,536,913 tons





Two scenarios were compared: “*zero scenario*” vs “*plan scenario*”  
in two different contexts: **trend framework** vs “*target framework*”

**Functional unit**

1,675,614 tons

1,536,913 tons

The **trend framework** is based on the trend of waste production observed in the last decade coherently with what has been observed on a national scale.

Two scenarios were compared: “*zero scenario*” vs “*plan scenario*”  
in two different contexts: “*trend framework*” vs “*target framework*”

**Functional unit**

1,675,614 tons

1,536,913 tons

The **target framework** reaches the most ambitious reduction goals since it's based on reduction and prevention actions on waste actuated by the plan.



Results from “zero scenario” to “plan scenario” are based on the following main operational phases:

- Sharp **decrease in landfill** use
- **Pre-treatment decrease**
- Treatment and **energy recovery increase**
- **Transportation reduction**

Impact categories/ frameworks	Trend	Target
<b>GWP20*</b>	-92% CO <sub>2</sub> EQ	-94% CO <sub>2</sub> EQ
<b>Fossil resource depletion</b>	-36% GJ	-39% GJ

\*Global Warming Potential over 20 years



Rome's mayor **Roberto Gualtieri** signed an ordinance launching an official **EXPRESSION OF INTEREST** to the private sector for the construction of a **waste-to-energy plant**, through project financing.

In this way the Italian capital would be able to autonomously **treat its own waste** without having to rely on other regions and nations.



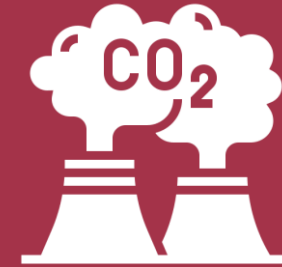
The expression of interest concerns the **design, authorization for operation, construction and management of a waste-to-energy plant** and "ancillary" plants, responsible for managing the residual ash from heat treatment. The capacity of the plant will reach **600,000 t/y of unsorted waste**.



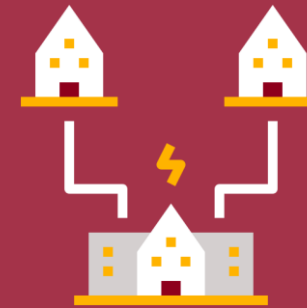


The contractor will also have **other responsibilities**:

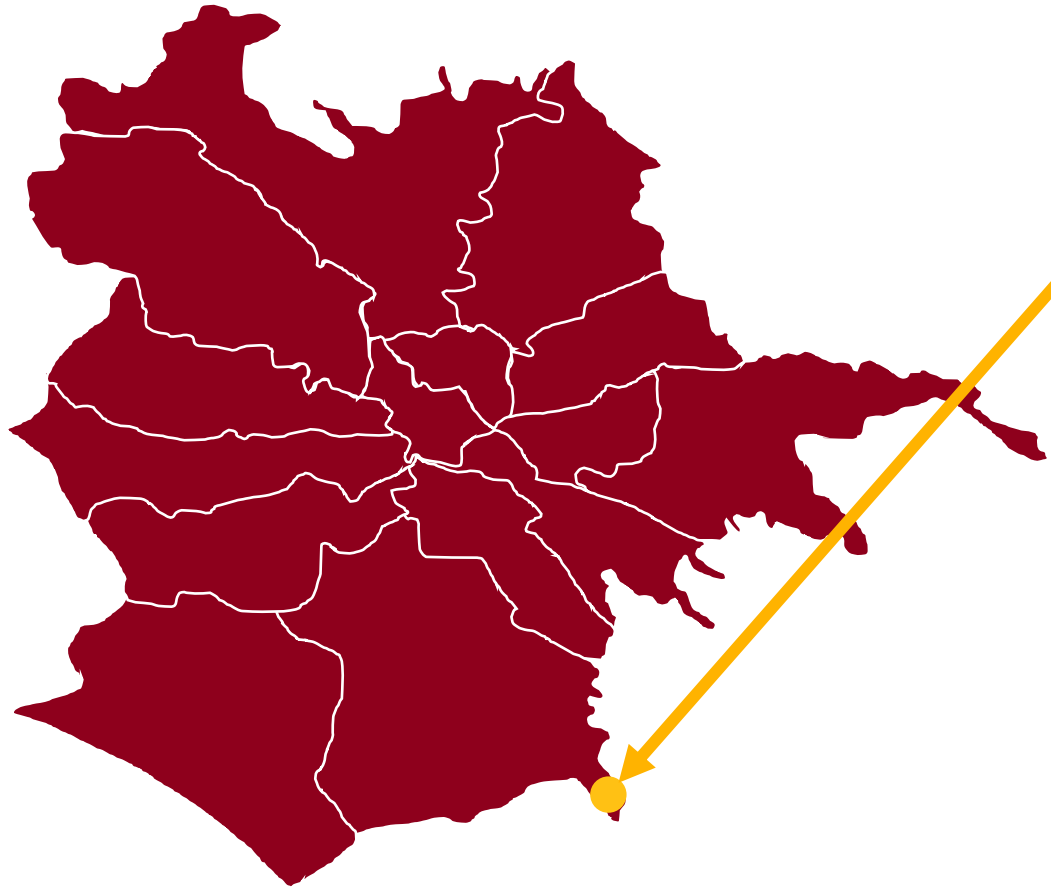
➤ **mitigate carbon dioxide emissions** (capture of CO<sub>2</sub>)



➤ **optimize the distribution of recovered energy vectors** (production and distribution of the electric and thermal energy produced).



The proposals must contain a **feasibility project**, a **draft agreement**, the **economic-financial plan** and the **specification of the characteristics of the service and management methods**.



The WtE plant will be built in the industrial area of **S. Palomba** (in the south of Rome).

More than **90% of bottom and fly ash** produced by the plant will be recovered and, as an inert material, **destined for roadbeds and building uses.**

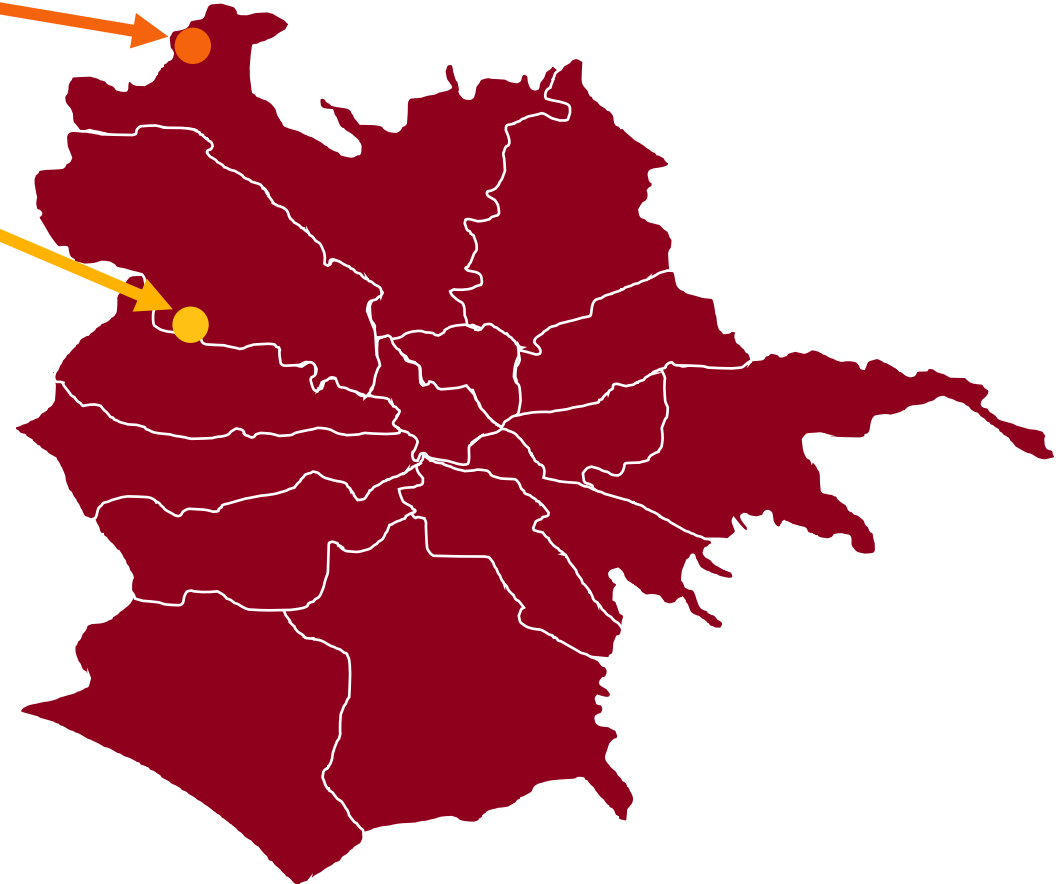
The construction of **service landfills is not envisaged**, indeed one of the aims of the plan is to achieve “zero landfill” objective.

The building of the WtE Plant should **begin in the summer of 2024 and be finalized in 2026.**



The waste management plan of Rome envisages the construction of **two anaerobic digestors plants** for the treatment of organic waste and production of biomethane and compost **located in Casal Selce and Cesano.**

The integrated plant includes the **anaerobic digestion** process and the **aerobic stabilization** process.



The facilities will have the same performance and structures, with a daily performance of treatment of roughly **321 t/day**.

## Production of biomethane

Type of product	LNG
Estimated produced quantity	<b>5,345,400</b> kg/year
Type of upgrading used	Selective membranes
stocking GNL	Cryogenic tank above the ground

## Cogeneration (thermal and electric self-consumption plant)

Electric power installed	<b>1.700</b> kW
Thermal power installed	<b>1.900</b> kW
Fuel used	Self-production of biogas from the plant (self-consumption)
Consumption of fuel	About <b>4.100.00</b> Nm <sup>3</sup> /year

