

# **WASTE MANAGEMENT IN ITALY: BALANCING INCINERATORS, ENERGY RECOVERY AND ZERO WASTE.**

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- **GEOECONOMIA**

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## Introduction

The management of waste in Italy is regulated by the Environmental Code, whose latest modification dates to February 27, 2023<sup>1</sup>. In particular, the principles that govern such management are precaution, prevention, sustainability, proportionality, and responsibility. The concept of precaution, among all, constitutes the basis of the European Union's environmental policy<sup>2</sup> and is also crucial for waste management in Italy. In addition, article 178 of the Environmental Code<sup>3</sup> emphasizes the importance of cooperation among all parties involved in the production, distribution, use, and consumption of goods that generate waste. In particular, the purpose of this analysis is to focus on energy production from waste and on the discussion of the potential disincentives to separate waste collection that may arise, following the waste management hierarchy criteria outlined in the Article 179 of the Code<sup>4</sup>. This gives top priority to waste prevention, in which eco-design comes into play, followed by preparation for reuse, recycling, recovery of other materials, and finally disposal. The focus on waste prevention and recycling highlights Italy's commitment to sustainable waste management practices, comparable to the European concept of Zero Waste<sup>5</sup> (ZW) for the goal of reducing waste volume and promoting recycling and waste prevention practices. Nonetheless, the European ZW policy sets an even more ambitious objective, which will be exemplified in this analysis through the lens of the Italian ZW movement.

## Overview

In 2020, 31% of urban **waste production** in the EU27 was recycled, 26% was recovered for energy, 18% was composted and subjected to aerobic/anaerobic digestion, 24% was landfilled, while incineration accounted for less than 1%<sup>6</sup>. Focusing on **recycling**, in 2020, over 111 million tonnes of urban waste were recycled in the EU27, with 9 out of 27 countries processing at least 30% of urban waste for material recycling. Italy recycles 30.4% of the urban waste processed and subjects 26.1% to composting and anaerobic digestion, resulting in a total share of waste subjected to recycling operations amounting to 56.5%. From 2018 to 2020, **waste sent for energy recovery** in the EU27 increased by 4.9% (2.8 million tonnes). During the same period, Italy registered a decrease of -2.1%, with a quantity of approximately 5.5 million tonnes. The countries that most prefer incineration with energy recovery over landfill disposal are Sweden, Finland, Denmark, Estonia, Belgium, Luxembourg, and the Netherlands. Regarding the **overall production of urban waste at the national level**, in 2021 it amounted to around 29.6 million tons, registering an increase of 2.3% (677 thousand tons) compared to 2020. In the North of Italy, the total amount of **separated waste collected** amounts to 10.1 million tons, in the Central regions about 3.8 million tons, and in the South almost 5.1 million tons. These numbers are the percentages relative to the total production of urban waste in each area,

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<sup>1</sup> TUA: "Testo Unico Ambientale" (or, even more improperly, "Environmental Code") means Legislative Decree No. 152 of April 3, 2006, which came into force in its historic text on April 29 of that year, and which contains the main regulations governing environmental. Normattiva, (2023). Legislative Decree 3 April 2006, no. 152. Available online at: <https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2006;152>.

<sup>2</sup> TUE. Article 191, 2° comma. Signed on February 7, 1992. Available online at: <https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=celex%3A12016E191>.

<sup>3</sup> Art. 178, TUA.

<sup>4</sup> Art. 179, TUA.

<sup>5</sup> Zero Waste Europe. (2022). Zero Waste Europe Strategic Framework 2022-24. Available online at: <https://zerowasteurope.eu/wp-content/uploads/2022/05/ZWE-Strategic-Framework-2022-24.pdf>.

<sup>6</sup> ISPRA, (2022) I. Rapporto Rifiuti Urbani. (No. 380/2022). Available online at:

<https://www.isprambiente.gov.it/it/archivio/eventi/2022/12/presentazione-del-rapporto-rifiuti-urbani-edizione-2022>.

which is 71% for the Northern regions, 60.4% for the Central regions, and 55.7% for the Southern regions<sup>7</sup>.

In terms of **separate waste collection** of urban waste, there have been particular developments in regional collection percentages over the years (Figure 1).

Figure 1: Evolution of regional percentages of separate collection of urban waste (%), years 2005-2021. ISPRA (2022)<sup>6</sup>



However, the differences between regions are still visible. In fact, in 2021, the Veneto region achieved the highest percentage of separate waste collection with 76,2%, followed by Sardinia, Lombardy, Trentino-Alto Adige, Emilia-Romagna, and Marche. In particular, the national average is 64%, and only 12 regions have a collection rate equal to or above it. The regions with the lowest collection rates are Campania with 54.6%, Lazio, and Calabria. Only Sicily falls below 50%, with a rate of 46.9%<sup>8</sup>

### Incinerators, energy recovery and the debate on the disincentive to separate waste collection.

When focusing on the issues of incinerators, it is worth specifying that there are two lines of thought in debate with each other, as waste management has its own history, consisting of ideas, technologies and values. In particular, the ZW strategy aims to fully recover the value present in the waste, significantly decrease the quantity of waste generated in urban areas, and phase out the *Take-make-*

<sup>7</sup> ISPRA, 2022 I.

<sup>8</sup> ISPRA, 2022 I.

waste (TMW) approaches that rely on incinerators and landfills. On the other hand, the TMW approach considers waste separation and reduction policies as supplementary measures rather than exclusive ones for efficient waste management<sup>9</sup>.

For what concerns the national field, how the two strategies are being balanced<sup>10</sup> can be deciphered from the latest ISPRA (2022) analysis<sup>11</sup>, which emphasizes the need to accelerate the improvement of the waste management system, particularly in certain areas of the country. Specifically, ISPRA (2022)<sup>12</sup> claims that landfill disposal will have to be halved in the next 15 years, while the percentage of waste destined for material recovery operations will have to significantly increase. It is also highlighted that the share of waste sent to incineration without energy recovery and destined for landfill must be included in the landfill disposal share. In this regard, the treatment of biodegradable waste<sup>13</sup> plays a leading role in reducing landfill disposal, improving collection performance and simultaneously producing energy. In fact, ISPRA (2022)<sup>14</sup> highlights that incineration with energy recovery and the mechanical-biological treatment of undifferentiated urban waste are among the management forms that help divert significant quantities of biodegradable waste from landfill disposal.

As for the role of incinerators in Italy, there were 37 operating plants in 2021 that processed municipal waste and waste derived from their treatment. The majority of the plant park is situated in the northern regions, with a total of 26 plants. Lombardy and Emilia-Romagna have 13 and 7 operating plants respectively. In 2021, these plants treated approximately 2.9 million tons of municipal waste, which represents 74.3% of the waste incinerated in the North and 53.1% of the national total. In the Center and South of Italy, there are 5 and 6 operational plants respectively, which treated almost 527 thousand tons and one million tons of municipal waste<sup>15</sup>.

Referring to the 2020-2021 analysis by ISPRA (2022)<sup>16</sup>, there is an increase of almost 85 thousand tons of urban waste incinerated in the national territory. Moreover, all Italian plants, except for the Montale (PT) incinerator, recover energy. In 2021, 23 plants processed around 2.8 million tons of waste and recovered nearly 2.2 million MWh of electric energy. 13 plants equipped with cogeneration cycles<sup>17</sup> incinerated over 3.2 million tons of waste, recovering more than 2.4 million MWh of thermal energy and 2.2 million MWh of electric energy. Regarding the energy recovery trend of incineration plants that mainly process municipal waste, there has been a consistent rise in the production of electrical energy from 4 million MWh in 2012 to more than 4.5 million MWh in 2021. Thermal energy, produced exclusively by plants located in the North, increased from around 1.3 million MWh in 2012 to over 2.3 million MWh in 2021<sup>18</sup>.

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<sup>9</sup> Marciano C. (2021) Zero Waste. Gestione dei rifiuti e trasformazioni sociali, in «Cambio. Rivista sulle trasformazioni sociali», Vol. 11, n. 21:149-161. Available online at:

[https://www.researchgate.net/publication/358119381\\_Zero\\_Waste\\_Gestione\\_dei\\_rifiuti\\_e\\_trasformazioni\\_sociali](https://www.researchgate.net/publication/358119381_Zero_Waste_Gestione_dei_rifiuti_e_trasformazioni_sociali)

<sup>10</sup> “ZW and TMW should be considered as opposite poles of a single operational continuum in waste management. [...] In Italy, and in many other European Union countries and beyond, waste management adopted by municipalities and regions based on their respective competencies often results from a compromise between the two paradigms.” Marciano C. (2021:152).

<sup>11</sup> ISPRA, 2022 I.

<sup>12</sup> ISPRA, 2022 I.

<sup>13</sup> Regarding this issue, ISPRA (2022) I mentions Directive 1999/31/EC and Legislative Decree No. 36/2003.

<sup>14</sup> ISPRA, 2022 I.

<sup>15</sup> ISPRA, 2022 I.

<sup>16</sup> ISPRA, 2022 I.

<sup>17</sup> Contemporary production of electrical energy and heat by a plant (cogeneration plant) for a more rational use of the supplied energy. Treccani. (2012). Energia elettrica. In Enciclopedia Treccani.

<https://www.treccani.it/enciclopedia/cogenerazione/>

<sup>18</sup> ISPRA, 2022 I.

Another significant aspect is that of waste exportation, which is nevertheless destined for energy production elsewhere. Specifically, compared to 2020, in 2021, waste exports increased by 13.3% to a total of around 659 thousand tons. Out of the total amount, 51.5% (equivalent to more than 339 thousand tons) were allocated for material recovery, 42.3% (over 278 thousand tons) were used for energy recovery, 6.2% (about 41 thousand tons) were utilized for disposal operations, and only 0.04% (273 tons) were directly incinerated<sup>19</sup>.

Based on the information presented in this analysis, it can be predicted that the TMW strategy is likely to take a leading position. Although incineration with energy recovery can help divert significant amounts of biodegradable waste from landfills, excessive dependence on this method for waste management may result in negative environmental effects, such as air pollution and greenhouse gas emissions, and hinder the transition towards a more circular and sustainable economy.

Moreover, there is an imbalance in regional distribution, with the majority of incineration plants located in northern regions. This may lead to an unequal distribution of waste management facilities across the country, resulting in other regions lacking proper waste treatment facilities or having to transport their waste over long distances for treatment. This, in turn, could lead to additional costs and environmental impacts associated with waste transportation.

Another potential future issue for Italy could be its reliance on exporting waste abroad for management, which could make it more challenging for the country to develop a circular economy domestically based on waste reduction, reuse, and recycling within its own territory.

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<sup>19</sup> ISPRA, 2022 I.

## Conclusions

Regarding the introduced debate, ISPRA (2022)<sup>20</sup> declares that the use of incineration does not constitute a disincentive to raise separate waste collection, which has continued to increase over the years (Figure 1). Nonetheless, the ZW strategy critiques the linear vision of economic development and its performance indicators, prioritizing environmental goals in waste management. It proposes redefining waste management with more autonomy for municipalities and greater community involvement in service design. The strategy also includes innovative solutions such as metropolitan door-to-door waste collection, digital user recognition-based tariffs, and the creation of mega-plants and electrified community composters, which differ from the solutions proposed by the TMW model.

Although this analysis did not go into detail on the measures adopted in different regions and/or municipalities, it is possible to understand that the Italian waste management strategy is a compromise between the two paradigms presented.

As part of the *Zero Waste Europe* (ZWE) strategy, the Commission encourages Member States to adopt or update their respective national strategies, plans, and measures in this regard, discouraging incinerator-based solutions, which are seen as an obstacle rather than a support to the transition to a circular economy<sup>21</sup>. Despite the fact that projects aligned with the most ambitious European goals are on the rise<sup>22</sup>, energy recovery from waste is playing a significant role in the implementation of regional waste management planning, as well as in the monitoring of updated waste production prevention Plans or Programs adoption by Regions or Autonomous Provinces<sup>23</sup>.

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<sup>20</sup> ISPRA, 2022 I.

<sup>21</sup> European Commission, A new Circular Economy Action Plan, 2020. Available online at: [https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF).

<sup>22</sup> ISPRA, (2022) II. Indagine conoscitiva sulle misure di prevenzione della produzione dei rifiuti urbani adottate dai comuni. (No. 370/2022). Available online at: [https://www.isprambiente.gov.it/files2022/pubblicazioni/rapporti/rapporto-prevenzione\\_-n-370\\_2022.pdf](https://www.isprambiente.gov.it/files2022/pubblicazioni/rapporti/rapporto-prevenzione_-n-370_2022.pdf).

<sup>23</sup> ISPRA, 2022 I.