

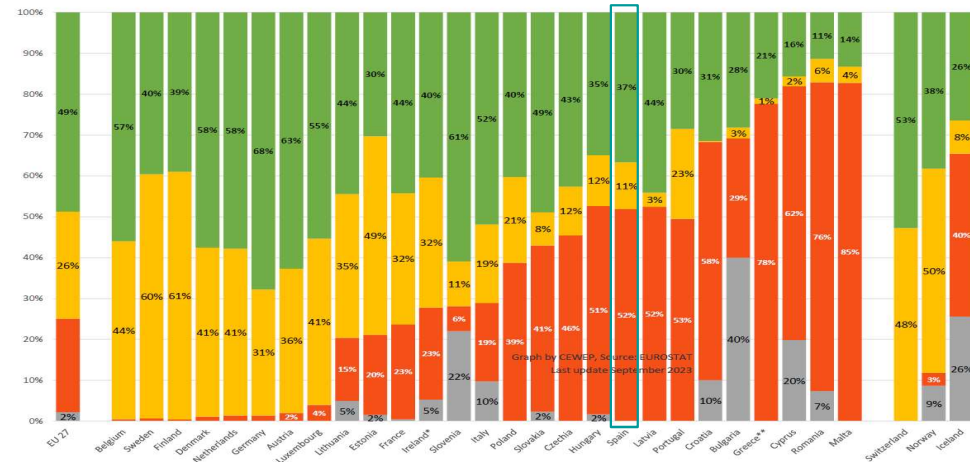
# Municipal and Similar Waste Management in Spain



14 May 2024

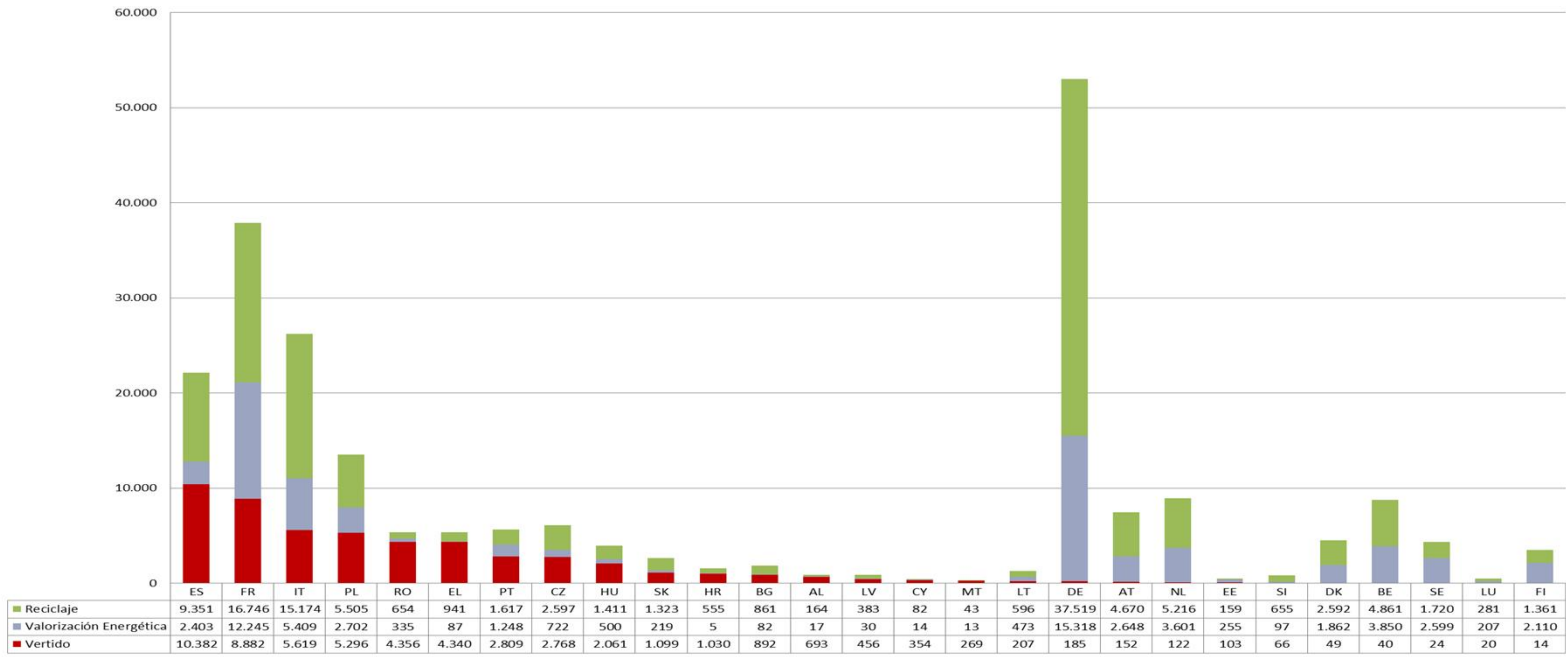
CEWEP EUROPEAN SESSION  
IFAT MUNICH

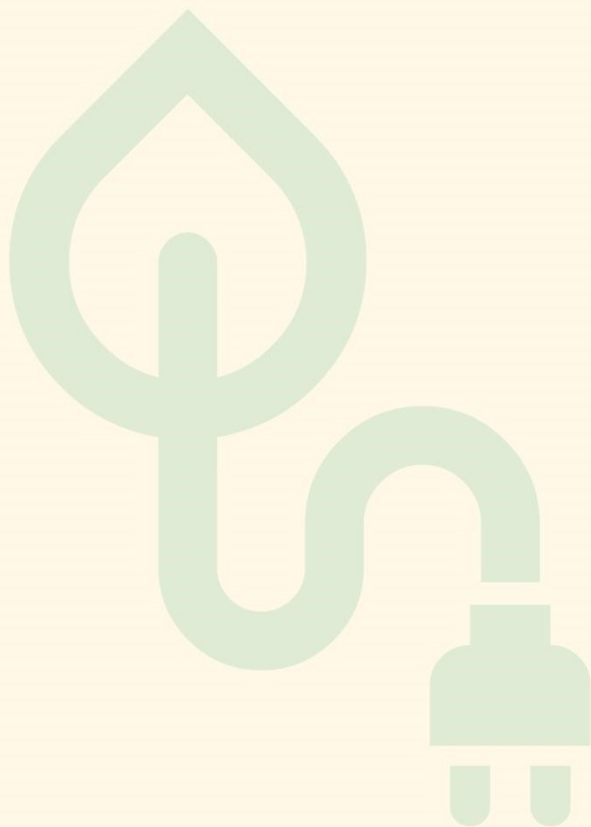
### Municipal waste treatment in 2021



Percentages are calculated based on the municipal waste reported as generated in the country  
 \*: last available data 2020  
 \*\*: last available data 2021

### Tratamiento Residuo Municipal EU-27 (kton) 2021





WTE (t/year)

2021

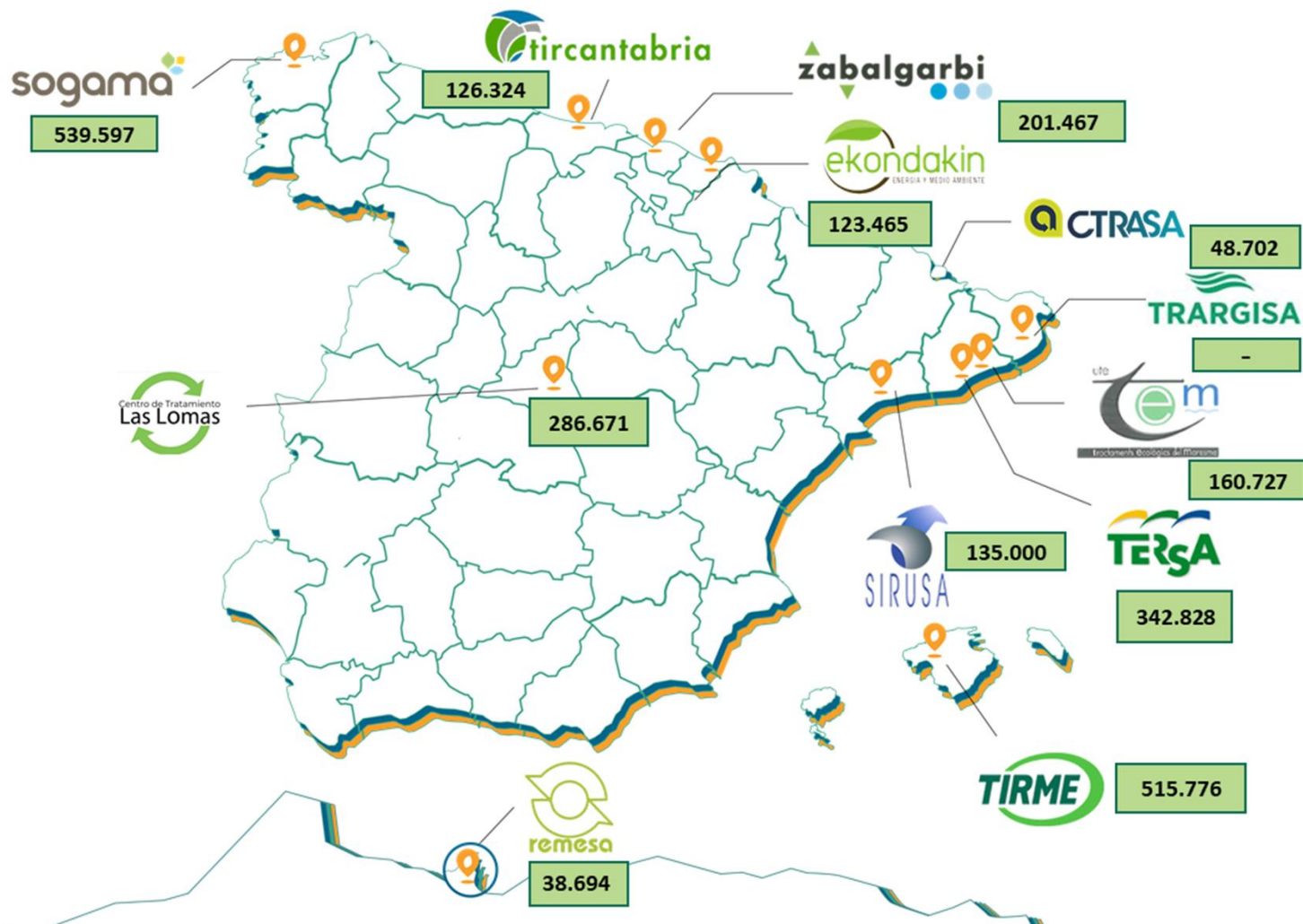
TOTAL 2.480.520

2022

TOTAL 2.544.408

2023

TOTAL 2.519.254



Waste to Energy in Spain and Andorra. (2023)

WTE (MWh)

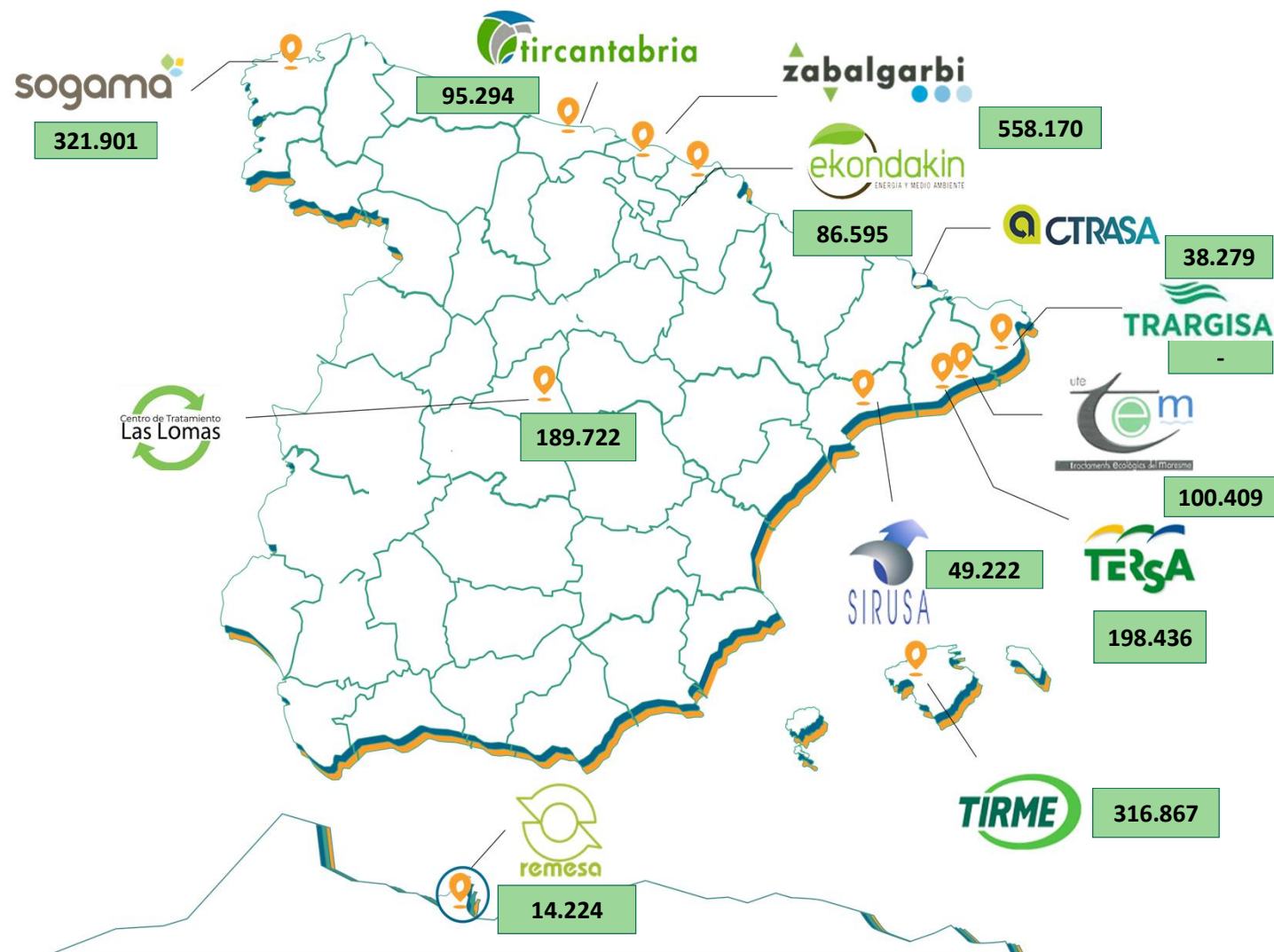
2023

|       |           |
|-------|-----------|
| TOTAL | 1.969.119 |
|-------|-----------|

2023

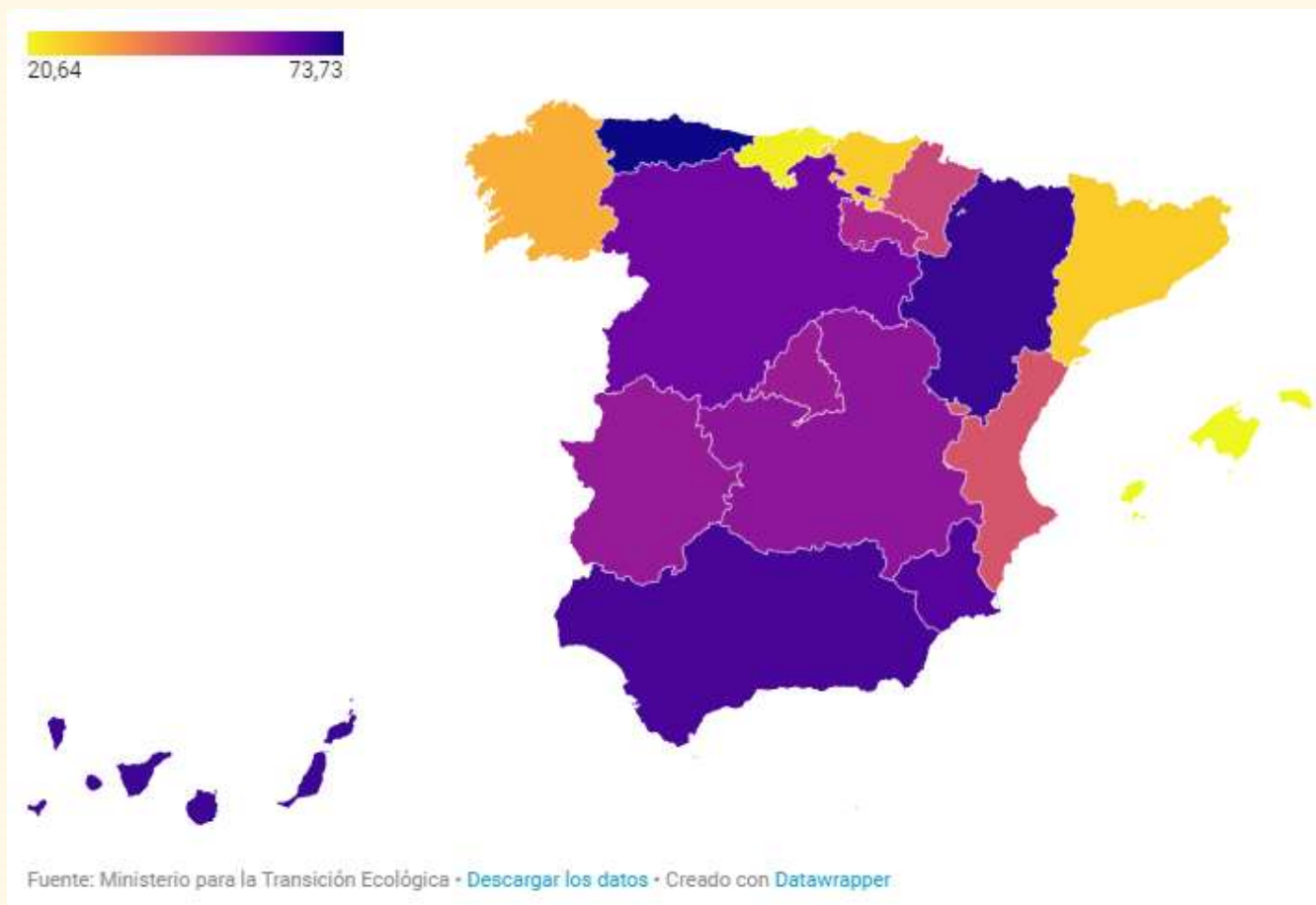
|                            |        |
|----------------------------|--------|
| DISTRICT HEATING / COOLING | 40.196 |
|----------------------------|--------|

Waste to Energy in Spain and Andorra. (2023)



| CCAA                       | %     |
|----------------------------|-------|
| Canarias                   | 69.97 |
| Melilla                    | -     |
| Ceuta                      | -     |
| La Rioja                   | 56.03 |
| País Vasco                 | 27.42 |
| Comunidad Foral de Navarra | 50.45 |
| Región de Murcia           | 66.95 |
| Comunidad de Madrid        | 58.51 |
| Galicia                    | 32.42 |
| Extremadura                | 59.37 |
| Comunidad Valenciana       | 47.85 |
| Cataluña                   | 27.53 |
| Castilla-La Mancha         | 60.31 |
| Castilla y León            | 63.78 |
| Cantabria                  | 22.21 |
| Islas Baleares             | 20.64 |
| Principado de Asturias     | 73.73 |
| Aragón                     | 70.13 |
| Andalucía                  | 68.65 |

## Percentage of MW landfilling (per region) in Spain



**In Spain, the main MW management system is still direct disposal at landfill sites, which receive 47% (10,4 million tonnes) of the MW generated, followed by recycling (42%) and energy recovery (11%)**

|                        | Recycling<br>(Source-separated<br>MW) | Recycling<br>(MBT-mixed MW) | Home &<br>Community<br>Composting | Composting / AD<br>organic fraction | Composting / AD<br>MBT | Incineration /<br>Co-incineration | Landfilling<br>(rejects from MW<br>treatment) | Landfilling<br>(untreated waste) | TOTAL             |
|------------------------|---------------------------------------|-----------------------------|-----------------------------------|-------------------------------------|------------------------|-----------------------------------|---|----------------------------------|-------------------|
| Andalucía              | 375.858                               | 180.829                     | 0                                 | 61.932                              | 1.184.314              | 0                                 | 2.352.891                                     | 295.783                          | <b>4.451.607</b>  |
| Aragón                 | 77.734                                | 9.306                       | 0                                 | 1.805                               | 92.923                 | 168                               | 150.163                                       | 221.272                          | <b>553.371</b>    |
| Principado de Asturias | 78.293                                | 0                           | 5.218                             | 19.094                              | 0                      | 0                                 | 15.404  | 389.676                          | <b>507.685</b>    |
| Islas Baleares         | 128.562                               | 6.574                       | 0                                 | 41.169                              | 58.709                 | 395.761                           | 78.312  | 0                                | <b>709.087</b>    |
| Canarias               | 135.252                               | 251.040                     | 0                                 | 2.112                               | 163.197                | 0                                 | 519.097                                       | 102.222                          | <b>1.172.921</b>  |
| Cantabria              | 28.870                                | 13.222                      | 113                               | 36                                  | 52.210                 | 120.874                           | 44.110  | 17.352                           | <b>276.788</b>    |
| Castilla-La Mancha     | 88.142                                | 33.627                      | 0                                 | 2.121                               | 209.896                | 0                                 | 485.446                                       | 57.255                           | <b>876.487</b>    |
| Castilla y León        | 140.592                               | 27.231                      | 0                                 | 0                                   | 210.734                | 0                                 | 671.438                                       | 1.323                            | <b>1.051.318</b>  |
| Cataluña               | 832.366                               | 145.180                     | 7.136                             | 395.174                             | 562.634                | 623.044                           | 510.636                                       | 370.438                          | <b>3.446.608</b>  |
| Ceuta                  | 1.704                                 | 1.303                       | 0                                 | 0                                   | 12.141                 | 0                                 | 20.325  | 0                                | <b>35.474</b>     |
| C. de Madrid           | 404.603                               | 47.104                      | 0                                 | 222.986                             | 138.373                | 309.724                           | 677.734                                       | 795.568                          | <b>2.596.090</b>  |
| C. Foral de Navarra    | 63.854                                | 2.887                       | 6.710                             | 26.511                              | 28.726                 | 0                                 | 57.172  | 83.483                           | <b>269.342</b>    |
| C. Valenciana          | 522.141                               | 130.845                     | 1.236                             | 43.921                              | 856.077                | 6.943                             | 1.108.857                                     | 0                                | <b>2.670.019</b>  |
| Extremadura            | 48.605                                | 16.507                      | 0                                 | 130                                 | 157.202                | 0                                 | 263.047                                       | 0                                | <b>485.491</b>    |
| Galicia                | 127.711                               | 43.592                      | 1.680                             | 8.913                               | 45.476                 | 545.869                           | 341.265                                       | 9.398                            | <b>1.123.902</b>  |
| La Rioja               | 24.267                                | 3.442                       | 0                                 | 691                                 | 55.227                 | 0                                 | 45.162  | 0                                | <b>128.789</b>    |
| Melilla                | 4.790                                 | 0                           | 0                                 | 0                                   | 0                      | 41.036                            | 0   | 0                                | <b>45.827</b>     |
| País Vasco             | 275.138                               | 14.830                      | 3.367                             | 33.540                              | 91.086                 | 359.906                           | 131.854                                       | 1.897                            | <b>911.618</b>    |
| Región de Murcia       | 89.206                                | 28.595                      | 0                                 | 11.356                              | 146.266                | 0                                 | 538.697                                       | 24.574                           | <b>838.693</b>    |
| <b>TOTAL</b>           | <b>3.447.688</b>                      | <b>956.115</b>              | <b>25.460</b>                     | <b>871.489</b>                      | <b>4.065.190</b>       | <b>2.403.326</b>                  | <b>8.011.609</b>                              | <b>2.370.239</b>                 | <b>22.151.117</b> |

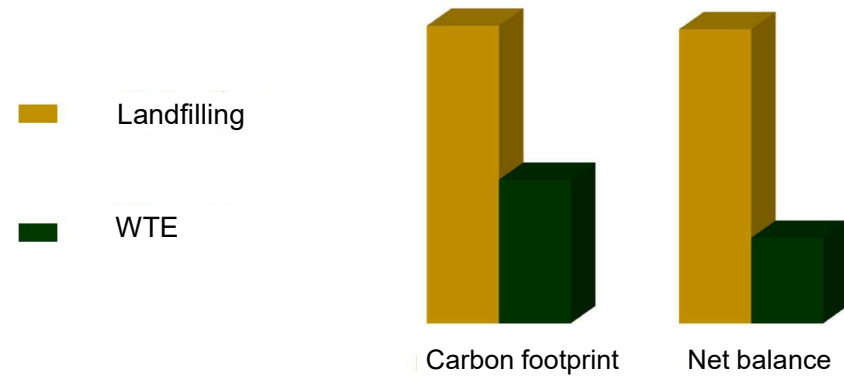
Source: Data from the Ministry of Ecological Transition and Demographic Challenge. Annual report on municipal waste generation and management (2021)



Energy recovery from municipal waste in Spain and Andorra: carbon footprint and comparison with landfill

15<sup>th</sup> March 2021

MW disposal at a landfill site generates about twice as many GHG emissions as energy recovery, per tonne of treated waste, and the net balance is 3.5 times greater.



| Scope                                     | Emissions per tonne of waste (Kg CO <sub>2</sub> e / t RU) |                 | Difference Landfill-Recovery             |                |
|---|--|-----------------|--|----------------|
|   | Waste at landfill sites                                    | Energy recovery | Difference (Kg CO <sub>2</sub> e / t MW) | Difference (%) |
| Scope 1 (Direct emissions)                | 781.0  | 356.9           | +424.1                                   | +119%          |
| Scope 2 (Indirect emissions)              | -  | 20.2            | -20.2                                    | -100%          |
| <b>Carbon footprint (total emissions)</b> | <b>781.0</b>   | <b>377.1</b>    | <b>403.9</b>                             | <b>+107%</b>   |
| Emissions prevented                       | 9.2  | 153.1           | -143.9                                   | -94%           |
| <b>Total net balance</b>                  | <b>771.8</b>   | <b>224.0</b>    | <b>547.8</b>                             | <b>+245%</b>   |



At present:



2,5 Mt/year

**WASTE TO ENERGY**



+ 2.000 GWh/year



+ 1.200 GWh/year

- 245% GHG



It is necessary to double WTE capacity to reach at least 25%



Reclaje + compostaje



Valorización energética



Vertido

Current situation  
Spain

EU targets  
2035



42%



65%



11%



10%

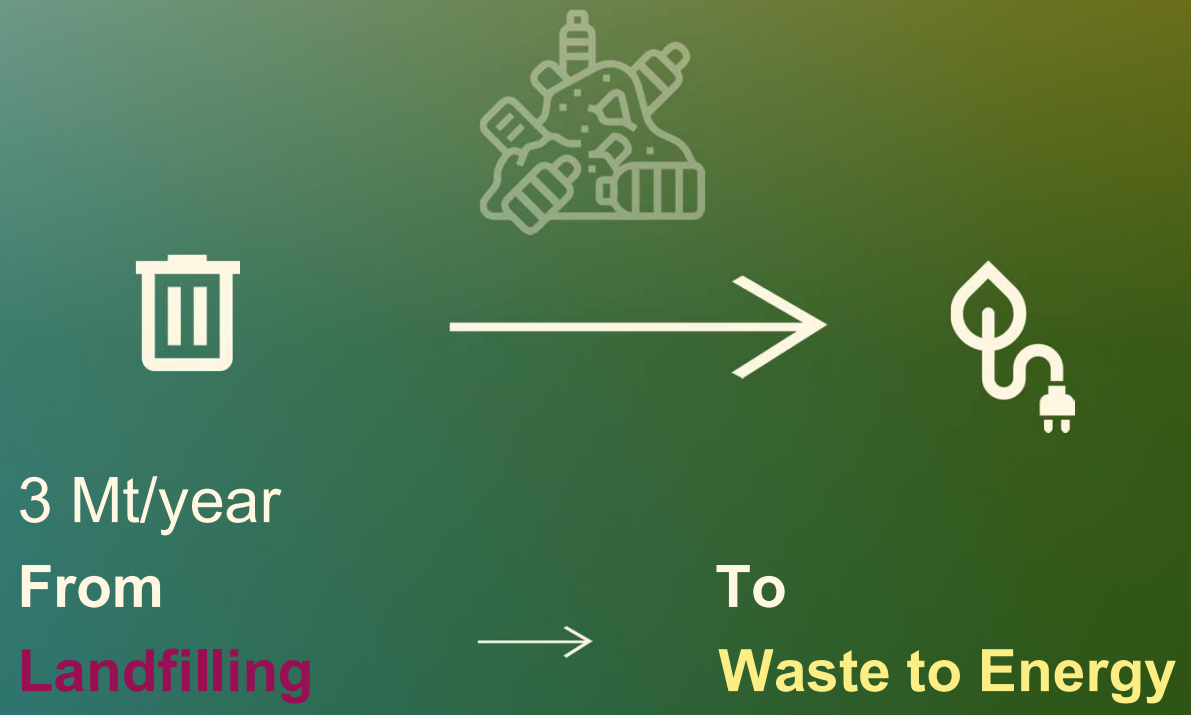


47%



10%

# Diverting 3 Million Tonnes from landfills to WTE would mean:



+ 2.400 GWh/year

+ 1.440 GWh/year

- 1,6 Mt CO<sub>2</sub>e

The complex block contains three icons: a battery with a lightning bolt, a glowing lightbulb, and a cloud with upward arrows and the label 'CO<sub>2</sub>e'. These icons are arranged vertically next to their respective numerical values.

# WTE bottom ash management

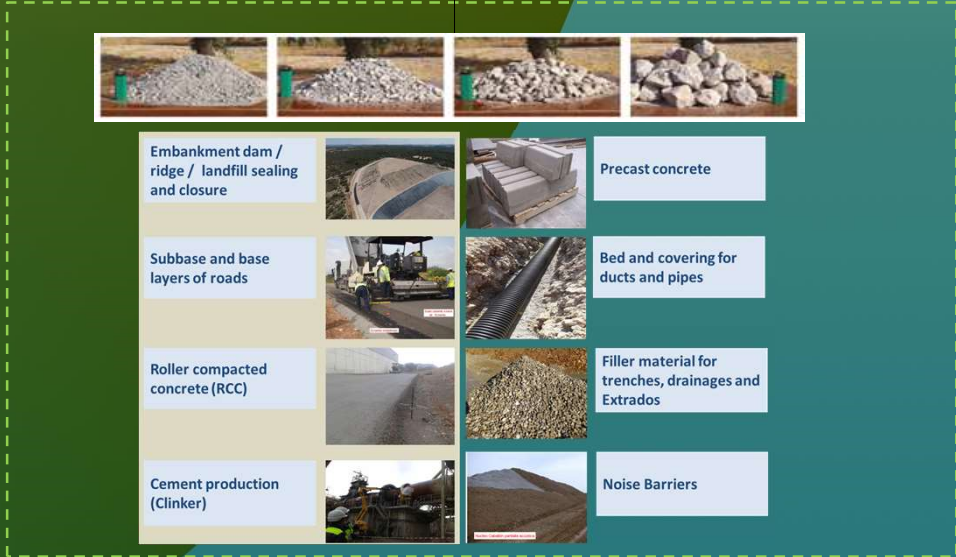
**Bottom Ash**  
+/- 400.000 tonnes/year

**Metallic Fraction**

**Mineral Fraction**



Depending on Demand

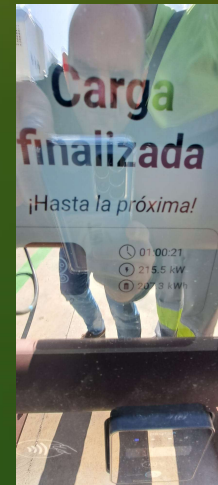


## Sector coupling: WTE - clean mobility

A 100% electric truck began its service in January 2014. It is a 10-ton vehicle that has six built-in batteries of 90 kWh each. Its maximum speed is 90 km/h. In total, the autonomy of this new truck is about 300 km.



Like in the film *Back to the Future*, a “DeLorean truck” is fuelled by “waste energy”





THANKS FOR YOUR ATTEMPTION

