Study Visit to Portugal

Principles and best practices of Zero Waste applied to collection and treatment

Content notes · 26–28 October 2026 · São João da Madeira and Beja

Highlights of the content of the visits - summarised version and available resources

1. The city of São João da Madeira: Zero Waste candidate city to prevention work

Door-to-door works, even in a dense urban setting.

Since 2021, the Municipality of São João da Madeira has progressively expanded its door-to-door collection system, which currently serves more than 300 commercial and restaurant establishments, around 20 schools, and approximately 6,886 residents (2024). Currently, 40% of the population is covered by door-to-door collection system of all 5 fractions (dry packaging -3, bio-waste and mixed waste), serving from single family houses to 4-storey buildings.

As regards bio-waste collection, ZERO's analysis of 2024 national data shows that door-to-door collection clearly outperforms bring schemes with road containers for biowaste. São João da Madeira captured 407 tonnes of biowaste with 10-litre kitchen caddies, covering only about 20% of its population. In the covered area, households separate around 93 kg of food waste per inhabitant per year, roughly half of the biowaste available, with contamination below 10%. Packaging capture (77 kg/inhabitant/year in 2023) is the highest among the municipalities served by ERSUC (link). Read more in this blog article.

	Collection model	Total tonnes	Population served	kg/inhabitant
Separate collection of recyclables (packaging waste)	Door-to-door	866	6886	126
	Street bins	823	15903	52
	Total	**1690**	**22789**	**178**
Door-to-door separate collection of bio-waste	Kitchen waste	407	4423	92
	Garden waste	800	4423	35
	Total	**1207**	**4423**	**127**

Long-term planning and the right tools. The system was built step by step since 2003: an Ecocentro and door-to-door collection for businesses (2009), a pilot in single-family homes with waste characterisation (2016/17), a municipal door-to-door service from 2019 and biowaste collection from 2022. Users are identified by chipped bins, which allows real-time monitoring and prepares the Pay-As-You-Throw (PAYT) system now being implemented. The 2024 action plan (PAPERSU) sets out 16 measures and a €3.8 million investment to 2030, with an estimated €4 million in avoided disposal costs.

Residual waste is falling fast. Between 2018 and 2023, residual waste dropped from 446 to 352 kg per inhabitant per year (about 20%). In practice, each resident now produces, in a full year, the residual waste they used to produce in about nine and a half months. The introduction of separate biowaste collection in October 2022 alone cut residual waste by 7% in a year, the sharpest drop on record, equivalent to removing almost a full month of residual waste in a single year. The municipality already meets the national waste management plan for municipal waste (PERSU) 2030 target for residual waste, and its total waste generation per inhabitant (470 kg in 2023) is below the national average (502 kg).

Pioneer implementation of waste fees São João da Madeira has run door-to-door collection for businesses since 2009, and the service now covers more than 300 shops and restaurants and around 20 schools. Non-domestic users pay their own tariff, with a fixed charge about three and a half times higher than for households. The PAYT scheme now being rolled out extends the same logic to households, so that each bill reflects the residual waste a user actually generates rather than their water consumption. Fairness is built into the tariff through a social rate with no fixed charge, a 5% discount per child beyond two for large families (up to 30%), and a reduced rate for non-profit and public-interest organisations.

A model adapted to the territory. Single-family areas are served door-to-door, while high-rise districts will use underground containers with controlled access for biowaste and residual waste, making the case relevant for other dense, mid-sized cities. Residents open these containers with an individual key, and an electronic lock records each deposit and this links the residual waste to the household that produced it, which is what makes PAYT possible in apartment buildings. According to the municipality, the initial extra cost of door-to-door has been offset by savings and revenue from recyclables.

Besides, the ratio of bins/inhabitants is higher than other municipalities and the average distance to the bin is 50 - 70 meters, which 30 -50% closer compared to the standard of the regulator (ERSAR), which is 100 metres.

Prevention and reuse policies. São João da Madeira has been working towards waste prevention for several years and is presently an active partner in Project ERIC. Since years there has been a clear objective to reduce single use plastic at many events (Carnival, fairs, municipal events) and it is now reaching other areas, like food waste prevention and reuse potential beyond packaging. The main activities are:

- Municipal event “A Cidade no Jardim”, a 5 days fair that happens every June has, since 2022, banned single use plastic items, avoiding more than 60,000 disposable cups and bottles in its last edition.
- Schools have water fountains and reusable bottles distributed by the Municipality to every student.
- Andebolmania is a youth handball tournament held every Easter in São João da Madeira, with around 160 teams and 2,500 athletes in 2026. In its 2026 edition, it cut waste by 72% (from 140,160 to about 39,000 litres) and single-use items by 52% compared with 2025. Following advice from the municipality and ZERO, the organisers replaced individually packaged meals with food served in bulk from large trays onto plates and bowls, served water in reusable jugs, and added separate-collection bins, with volunteers managing refills and sorting. The next step, for 2027, is to move to fully reusable meal containers. Read the case study: https://zerowasteeurope.eu/library/game-changer-how-a-handball-tournament-cut-waste-in-half/
- It is presently working with ZERO towards including reuse clauses in the Municipal Regulation regarding events.
- It is working with ZERO on a campaign to promote waste prevention strategies among the HORECA sector (as part of the larger initiative of introducing the PAYT among non-domestic users).

- The new Ecocentro (already approved) will include a reuse and repair centre, and the action plan also covers food-waste prevention and community composting.

2. MRBT facilities of Resialentejo in Beja: maximising waste diversion from landfill disposal and preventing methane emissions

What is Material Recovery and Biological Treatment (MRBT)?
MRBT systems are a cost-efficient technology which combines the use of advanced sorting systems applied to mixed waste (to extract additional material for recycling) with biological treatment of the remaining residual waste aimed at stabilising its fermentable materials. This ensures that the negative impacts of residuals are minimised when landfilled and at the same time keeps the flexibility required to continuously improve the performance of waste management systems.

MRBT should not be confused with Mechanical-Biological Treatment (MBT).
Traditional MBT includes equipment that turns the burnable parts of mixed waste, mainly paper and plastics, into refuse-derived fuel (RDF), intended for burning in incinerators or industrial plants. MRBT replaces this fuel production with equipment that recovers materials for recycling.
Find more information about MRBT in this policy brief.

Resialentejo (Beja) operates many MBT facilities across Alentejo. The facility we will be visiting is an advanced MBT moving towards the MRBT model. It already recovers materials from mixed waste and biologically treats the organic fraction. A small share of its output (below 5%) is still processed as refuse-derived fuel (RDF), which is the main gap between its current setup and a full MRBT. Resialentejo and Ambilital operate indeed the only Portuguese MBT facilities that include a full biological treatment stage for the organic fraction, whereas most other installations rely predominantly on mechanical sorting and send a significant share of untreated biodegradable waste directly to landfill.

By combining efficient mechanical separation with biological stabilisation of the organic fraction, these facilities achieve landfill diversion rates of approximately 66% at Resialentejo (against 29 % nationally). This shows how an advanced MBT moving towards the MRBT model can play in reducing the landfilling of biodegradable waste while complementing the expansion of separate biowaste collection.

	Resialentejo	Mainland Portugal
Full biological stabilisation	Yes	-
Landfill diversion rate (MRBT efficiency)[1]	66%	29%
Landfill disposal (total)	31%	54%
PRR contribution (link)[2]	62%	23%

[1] **Landfill diversion rate**: the percentage of mixed municipal waste entering the MRBT facility that is prevented from being landfilled after treatment. It is calculated as: (Unsorted waste entering MRBT − MRBT outputs sent to landfill) / Unsorted waste entering MRBT

[2] **PRR contribution**: calculated as the share of municipal waste generation contributing to the preparing for re-use and recycling (PRR) target, including separately collected recyclables and bio-waste, as well as the eligible fraction of bio-waste recovered from mixed waste through MRBT, in accordance with the current Portuguese methodology.

Why talk about MRBT? Why it is complementary to Zero Waste?

Portugal's landfills are filling up:

- More than half of municipal waste was landfilled in 2024;
- 13 of the 32 landfills have only about 20% of their capacity left;
- Only 23% of waste was prepared for reuse or recycled (against a 60% target for 2030).

Separate collection remains the priority. It takes years to scale up, however, and is still below 30% in regions such as Alentejo. Meanwhile, the EU Landfill Directive requires waste to be pre-treated before landfilling. The Directive defines "treatment" broadly, including biological processes and sorting, so that it reduces volume or hazard, eases handling or enhances recovery.

MRBT is a bridge for residual waste, and its technology present several advantages:

- **It is modular and adapts as separate collection grows.**
  - The stabilisation modules can later process clean biowaste from separate collection.
  - The biological units can later treat kitchen waste.
  - The sorting equipment can handle recyclables from separate collection.

- **It is smaller-scale and cheaper.**
  - 2020 EU-wide estimates an investment of about €200–400 per tonne of yearly capacity, compared with about €1,000 or more for an incinerator.
  - It works well below 100,000 tonnes a year. 2020 EU-wide estimates.

- **It is better for the climate.**
  - Stabilisation breaks down organic waste, avoiding the production of methane emissions when disposed of in landfills.
  - It produces compost of lower quality, a mature (Grade IV) organic soil improver classified as Class IIA under Decree-Law 103/2015, used mostly in silviculture and non-edible farmlands.
  - Plastics and synthetic textiles are recovered and sent for recycling or landfilled if rejects, not burned

- **It reduces landfill.**
  - Stabilisation is estimated to cut weight by 75% or the organic fraction (bio-waste, garden waste and paper/carboard=
  - Material recovery can remove up to about 30–35% more, depending on what is in the waste.

Resialentejo's plant follows the MRBT approach:

- It recovers materials and stabilises the organic fraction before landfill.
- It is important to note however that a small share of the output (below 5%) is processed as refuse-derived fuel (RDF). This RDF comes only from process rejects: non-recyclable materials and fractions with no viable collection system yet, such as textiles. **It is not meant to include packaging.**

⚠️Under a Zero Waste approach, nothing should be burnt. This share is therefore a gap to close, and should not be an end goal. The focus should be on what comes next - such as **developing collection and recycling routes** for the fractions that currently end up as RDF, such as textiles.