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BOOK
OF
PROCEEDINGS

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WASTES

SOLUTIONS
TREATMENTS
OPPORTUNITIES

6th International Conference **WASTES** SOLUTIONS TREATMENTS OPPORTUNITIES

6th International
Conference

september 6-8 | 2023
University of Coimbra



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CHALLENGES IN THE ACHIEVEMENT OF EUROPEAN TARGETS FOR RECYCLING: BIOWASTE TREATMENT INFRASTRUCTURES IN THE ALENTEJO-ALGARVE REGION

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ABSTRACT

The management of municipal solid waste (MSW) continues to be a challenge for municipalities and management entities that face upcoming European-wide targets. The aim is to transition to a management model that allows decoupling economic growth from the use of resources, reducing the impact on the environment, promoting the designs of a circular economy. The Portuguese Strategic Plan for Municipal Waste (PERSU 2030) sets ambitious goals for Portugal and for each management entities, in particular with regard to biowaste management, which is due to stir up the current collection and treatment. The aim of this work was to analyse 7 municipal waste management entities (SGRU) from Alentejo and Algarve region, with a focus on biowaste treatment facilities and their capacity to respond to the targets.

Keywords: biowaste, organics, recycling, composting, mechanical-biological treatment, European targets

INTRODUCTION

The European targets for preparation for recycling and reuse set for 2025, 2030 and 2035 appear to be still far from being achieved, whereas deadlines are becoming increasingly unfeasible to comply with. According to the EU Directive 2018/851, Member states should reach in 2025 a goal of 55% of municipal solid waste collected and prepared for being recycled and be reinstated into the market again, either in the shape of raw material or in the shape of final product [1]. In the last decades waste management policies have been focusing on recyclables (plastic, paper and glass), whereas their share of total MSW usually constitutes no more than 30%. Biowaste accounts for high percentages of MSW, normally between 35 and 40% [2]. Taking into account these premises, the afore-mentioned goals cannot be achieved with recyclables only, but a proficient separate collection of biowaste is therefore necessary. However, until 2023 Member states had no obligation to implement this specific flow and the organic fraction contained in mixed waste was partially separated through mechanical-biological treatment (MBT), which is meant to recover a variety of plastic and metals, whereas the organic matter is left for further treatment in either composting or anaerobic digestion facilities.

The importance of separating biowaste was first addressed in Council Directive 1999/31/EC (European Union, 1999). In reference to this fraction, the mentioned directive establishes that Member States should adopt measures to boost its separate collection, since biowaste represents around 40% of the municipal solid waste generated, and also due to the environmental benefits that can be obtained from it [3].

In Portugal MBT is a fundamental technology for waste treatment but performance might not be sufficient to fulfil the current challenges. According to regional data from 2021, biowaste accounted

for 30 to 40% of the total MSW [4]. This paper intends to assess the operational results of biowaste treatment facilities in the southern part of Portugal, namely in the regions of Alentejo and Algarve, including regional waste management entities (ALGAR, AMBILITAL, AMCAL, ECOLEZÍRIA, GESAMB, RESIALENTEJO and VALNOR).

WASTE MANAGEMENT SYSTEM IN PORTUGAL

Waste management in Portugal is fragmented at the regional level throughout the several municipal waste management entities. At the present time, there are 23 SGRU covering the entire continental territory, 12 of which are multi-municipal (operated by private companies controlled by the entity Environment Global Facilities - EGF) and 11 are inter-municipal, therefore they are public entities controlled by the municipalities. Each of these systems has the infrastructure to ensure the treatment of MSW produced in the respective area [5], but the efficiency of the operations and the quality of infrastructure are unevenly distributed.

Regarding the SGRU studied for this work, five of them are inter-municipal (AMBILITAL, AMCAL, ECOLEZÍRIA, GESAMB, RESIALENTEJO) whereas only two are multi-municipal (ALGAR, VALNOR). Regardless, the responsibilities of waste collection and treatment are normally shared by different entities, namely the municipalities, the SGRU and the EPR company (extended producer responsibility), called Sociedade Ponto Verde (SPV). These entities guide their activities according to the legislation and the policies dictated by the Ministry of the Environment (MA). MSW management activities are controlled and supervised by the Portuguese Environment Agency (APA) [6].

According to the Strategic Plan for Municipal Waste (PERSU 2030) the goals to be achieved for Preparation for reuse and recycling indicator are 55% until 2025, 60% until 2030 and 65% until 2035. In 2021 the result was only 33% (13%, according to the new calculation methodology) [4,7].

Table 1 presents a brief characterization of each SGRU, the position in 2021 and the targets, according the PERSU 2030, for the preparation for reuse and recycling indicator. The table also presents the potential for implementing the selective collection of biowaste for each SGRU.

As can be seen from the tables, Portugal is still far from reaching the targets set by PERSU 2030. Regarding the analysed SGRU, it is observed in table 1 that some have already presented satisfactory results in 2021. However, after 2027, only biowaste from selective collection can be included for accounting purposes in the target. Therefore, from 2027, onwards the role of MBT will change and waste management infrastructures will have to adapt to the new calculation methods.

On the one hand, the characteristics of MBTs allow to customize the waste flow according to the needs, meanings that organic waste from separately collected circuits can still be channelled through existing infrastructure. In order to evaluate the capacity of the market to absorb material flows, each of the 7 regional waste management systems were scrutinized and mass balance was performed for all the MBT facilities.

Table 1- SGRU characterization and data analysis

SGRU	Municipalities [number]	Area [km ²]	Population [inhabit.]	Infrastructures for biowaste treatment	Preparation for reuse and recycling indicator			Total MW [t]	Positioning against goals			
					Situation in 2021 [%]	Target for 2030 [%]	Potential for implementation of selective collection of biowaste [%]		According RARU [4]		Calculated by mass balance	
									Recycling [%]	Organic valorization [%]	Recycling [%]	Organic valorization [%]
ALGAR	17	4997	465701	3 organic treatment plants, 1 MBT, 1 MT	17	60	82	382203	10	5	10	3
AMBILITAL	7	6416	113465	1 MBT	9	51	21	69136	9	0.5	9	0
AMCAL	5	1750	22909	Waste transferred to a MBT plant from another SGRU	34	57	0	14211	13	21	13	2
ECOLEZÍRIA	6	2357	121289	Waste transferred to a MBT plant from another SGRU	56	55	64	86074	10	27	10	3
GESAMB	11	6400	141306	1 MBT	39	63	30	63111	20	9	20	0.5
RESIALENTEJO	8	6650	86533	1 MBT	46	63	27	49273	13	25	13	11
VALNOR	25	11980	242643	1 MBT	54	56	30	121226	12	23	12	5

DISCUSSION AND CONCLUSIONS

Among the seven regional waste management entities, only one has so far opted for investing in separately collected biowaste valorisation without engaging mechanical-biological treatment: ALGAR. However, in 2021 material recycling and organic valorisation barely accounted for 15% of the total MSW collected. According to public data, in 2021, 14161 tons of biowaste were composted, representing a mere 3%, slightly below the final data that indicated a result of 5% instead.

In 2021 AMBILITAL reported the collection of garden waste (1593 ton) but there is no specification on treatment. 38.55 % of total MSW is estimated to be biowaste and it is almost not recycled [4]. TMB might not be operational and further information is required.

Some systems do not have any MBT instead, meanwhile mixed waste is transported somewhere else where it can be processed, as it is the case of AMCAL and ECOLEZIRIA, who depend on external facilities of GESAMB and RSTJ, respectively. In all cases, data presented in the yearly report of 2021[4] are controversial, since the gap between declared percentages or biological treatment and values obtained from published mass balances in the same document (27% towards 3%). The MBT plant of GESAMB processed 51749 ton of MSW, whereas 11% proceeded from AMCAL.

Eventually RESIALENTEJO and VALNOR are the 2 regional waste management companies that rely on their own infrastructure, with a strong focus on mechanical-biological treatment. In both cases material flows of inputs to and outputs from MBT showcased the same achievements of recycling that are described throughout the report. Biowaste treatment again proved to undergo serious challenges of miscounting and uneven declaration. As regards RESIALENTEJO, biowaste treatment to compost accounted for 11% based on mass balances instead of 25%, whereas for VALNOR the difference becomes sharper: 5% over 23%.

Overall, mass balances and material flows proved that very small amounts of biowaste were separately collected whilst MBT is the main technology used to separate waste streams. Nonetheless, there is no clear evaluation of the performance of those functioning MBT since the declared tons of compost obtained were never consistent with the quantity of biowaste treated. For the sake of the compliance with European targets and subsequent national goals, the infrastructures for biowaste treatment must be urgently upgraded to face upcoming challenges.

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