



Mind the gap: A model for the EU recycling target applied to the Spanish regions



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ABSTRACT

The recycling targets for municipal solid waste included in the EU Waste Framework Directive (WFD) are a relevant driver for sustainable waste management in the EU. According to the WFD, Member States should reach 50% recycling rate by 2020 while 65% has been recently approved for 2035. The aims of this paper are (1) to formalise the WFD definition of recycling rate, by converting it into a model that permits a systematic comparison across systems; and (2) to test the model by using a case study, in order to explore the analytical insights derived from the results, focused on the gap between the current management situation and the EU targets. To this end, a model is presented for the case of Spain at regional level (in Spain, the regional scale is relevant because the Autonomous Communities have to comply with the EU recycling targets according to the Spanish National Waste Management Plan). Results show that most Spanish regions will have to undertake profound changes regarding waste management in order to comply with the WFD. These changes are related to increasing separate collection (of food and garden waste, particularly), improving waste treatment efficiency and limiting the disposal of unsorted waste. The model informs policy-makers about the gap between the current performance of a given system (country, region, municipality) and the WFD target and identifies trade-offs between management strategies. It also contributes to the debate on the on-going revision of the WFD, particularly on the relevance of having a consistent definition of “municipal solid waste” accompanied by waste-stream specific definitions of “recycling”.

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1. Introduction

Sustainable municipal solid waste (MSW) management is one of the main environmental concerns in the European Union (EU), for which waste management regulation plays a principal role (European Union, 2013). The European Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008, on waste and repealing certain Directives (Waste Framework Directive, WFD), amended by Directive 2018/851, is a central piece of legislation in this context. The WFD has contributed to creating a common playing field regarding waste management in the EU, with the intention of increasing recycling and minimising landfilling across Member States (MS). Since the WFD was adopted, recycling of MSW in the EU grew from 36.8% in 2008 to 43.7% in 2014 (Eurostat, 2017).

In this context, the recycling target has been a crucial driver for improvement of waste management. Article 11 (2) of the WFD states that “by 2020, the preparing for re-use and the recycling of [municipal solid] waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households, shall be increased to a minimum of overall 50% by weight” (European Union, 2008). This target has posed a challenge to the EU Member States, in terms of unifying MSW management criteria and accounting methods, that has resulted in dissimilar results across countries: although the average recycling rate in the EU was 43.7% in 2014, 12 countries were below 30.0%, whereas 5 countries had already reached 50.0% (Eurostat, 2017). In 2015, the Circular Economy Package included a proposal to revise several legislative initiatives (i.e. including the WFD) and to implement an action plan with an aim of “closing the loop” of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy” (European Commission, 2015a). This proposal resulted into the amendment of the WFD through the

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Acronyms			
<i>Variables</i>			
BA_c	share of separately collected batteries and accumulators over MSW generation	$WEEE_c$	share of separately collected waste electrical and electronic equipment over MSW generation
BK_c	share of separately collected bulky waste over MSW generation	W_c	collection share of a specific waste stream over W
FGW_c	share of separately collected FGW treated at dedicated FGW_p over MSW generation	<i>Terms</i>	
GP_c	share of separately collected glass packaging over MSW	AC	Autonomous Community
G_c	share of non-packaging glass that is collected separately over MSW generation	BA	waste batteries and accumulators
LP_c	share of separately collected light packaging over MSW generation	BAT	best available techniques
MBT	share of USW treated at M_p , MB_p and $MBAD_p$ over MSW generation	BK	bulky waste
MET_c	share of separately collected non-packaging metals over MSW generation	EU	European Union
PC_c	share of separately collected paper and cardboard over MSW generation in one year	FGW	food and garden waste
PLA_c	share of separately collected non-packaging plastic over MSW generation	FGW_p	composting or anaerobic digestion facilities dedicated to separately collected FGW
R	rate of preparation for reuse and recycling according to the WFD	G	non-packaging glass
R_{ba}	recycling efficiency of BA_c	GP	glass packaging
R_{bk}	recycling efficiency of BK_c	LP	light packaging
R_{fgw}	recycling efficiency of FGW_c	LP_p	light packaging sorting plants
R_g	recycling efficiency of G_c	$MBAD_p$	mechanical sorting plus anaerobic digestion and composting of organic matter plants
R_{gp}	recycling efficiency of GP_c	MB_p	mechanical sorting plus biostabilisation of organic matter and composting plants
R_{lp}	recycling efficiency at LP_p	M-BT	mechanical-biological treatment. It refers to a set of treatment technologies devoted to materials recovery from unsorted residual waste through mechanical sorting, plus the biostabilisation of its organic fraction through anaerobic digestion and/or composting
R_{mbt}	recycling efficiency of MBT	MET	non-packaging metals
R_{met}	recycling efficiency of MET_c	M_p	mechanical sorting plants
R_{pc}	recycling efficiency of PC_c	MS	EU Member States
R_{pla}	recycling efficiency of PLA_c	MSW	Municipal solid waste
R_{tex}	recycling efficiency of TEX_c	PC	paper and cardboard
R_w	recycling efficiency for a given waste stream	PLA	non-packaging plastic
R_{wd}	recycling efficiency of WD_c	SC	separate collection
R_{weee}	recycling efficiency of $WEEE_c$	TEX	textiles
TEX_c	share of separately collected textiles over MSW generation	USW	unsorted residual waste
W	total amount of MSW generated in one year	WD	wood
WD_c	share of separately collected wood over MSW generation	WEEE	waste electric and electronic equipment
		WFD	Waste Framework Directive

Directive 2018/851, including a revised MSW recycling target, set at 55% by 2025, 60% by 2030 and 65% by 2035 (European Union, 2018a).

The aim of this paper is twofold. Firstly, to formalise the WFD definition of recycling rate, by converting it into a model that permits a systematic comparison across systems (i.e. MS, regions, municipalities, etc.). Secondly, to test the model by using a case study, in order to explore the analytical insights derived from the results, focused on the gap between the current management situation and the EU targets. On the one hand, the Spanish regions have been chosen because the National Waste Management Plan requires the Autonomous Communities (ACs) to individually achieve the recycling target that are set in the WFD. On the other hand, because of the dissimilar waste management approaches that have been adopted to date in each region.

The article is structured in the following way: The next section gives a brief overview of MSW management in Spain. Section 3 presents the model. Section 4 shows the results. Section 5 discusses the main findings. Section 6 concludes.

2. Overview of municipal waste management in Spain

According to Eurostat (Eurostat, 2017), the overall recycling rate of Spain was 30.8% in 2014. This ranged from 51% in La Rioja to 15% in the Canary Islands (Fig. 1). For a brief overview of the Spanish legal and administrative framework, see Annex 1.

2.1. MSW collection

MSW collection is carried out through five general collection models in Spain (Table 1). These models are generally based on collection using street containers plus an additional network of recycling centres (i.e. civic amenities) for some specific waste streams (e.g. bulky waste, waste from electronic and electrical equipment, oil, etc.). Collection models differ according to the number and type of waste streams that are collected separately, which may comprise paper and cardboard (PC), glass packaging (GP), light packaging (LP), food and garden waste (FGW) and residual unsorted waste (USW). Model 1 is mainly found in Catalonia, Pamplona (Navarra)

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