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Increasing the quantity of separated post-consumer plastics for reducing combustible household waste: The case of rigid plastics in Flanders

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ABSTRACT

In Flanders, Belgium, rigid and soft plastics represent an interesting fraction of residual household waste as a potential 80 000 Gg a^{-1} can be recycled instead of incinerated. Removing a large amount of rigid packaging and non-packaging plastics from the residual household waste fraction could contribute to the goal to reduce the amount of residual household waste to less than 150 kg $capita^{-1}$ a^{-1} for the Flemish region, where currently only 20% of plastics are collected selectively in drop-off facilities. Given the wide range of plastic separation schemes across the region, it is the aim of this paper to identify whether the applied separation options have an impact on the quantity of separated plastics, and, moreover, which scheme is able to separate most plastics. Cross-sectional data for the period 2008–2012 were collected for all 308 Flemish municipalities to conduct a regression analysis. The results of the analysis show that the quantity of separated plastics differs significantly between the different separation schemes used. If municipalities change their separation schemes, Flanders as a whole would be able to collect more plastic waste to better comply with its own objectives and EU regulation on recycling. Improved separation-at-source recycling initiatives, by applying the appropriate separation scheme for plastics, may increase recycling growth.

1. Introduction

The Flemish region of Belgium (Fig. 1) boasts the highest waste diversion rate in Europe. The waste diversion rate represents the amount of waste that is diverted from incineration to recycling. Almost three-quarters of the residential waste produced in the region is reused, recycled, or composted, whereas the average recycling rate in Europe amounts to only 39% (European Environment Agency). Since the first Waste Decree was approved in Flanders in 1981 (OVAM, 1981), regional goals (for overall residential waste generation, separate collection, and residual waste after source separation and home composting) have been met and then exceeded, allowing more ambitious goals to be set in subsequent waste plans which are developed every four to five years.

Through these waste plans, Flanders aims to significantly reduce the total amount of residual waste from households, companies and organizations during the period 2016–2022, by claiming different residual waste targets per cluster of municipalities. The latest Plan provides unique recycling services to suit the variety of residential conditions and, therefore, Flanders has moved away from the idea of the single target approach for the whole region which was in place until 2015 (OVAM, 2016). The regional waste authority OVAM (Openbare Vlaamse AfvalstoffenMaatschappij) has drawn up action plans for 6 waste fractions: organic-biological waste, packaging, rigid plastics, paper and cardboard, textile and commingled bulky waste. If no kerbside collection for a specific recyclable stream exists, citizens are urged to separate non-reusable but recyclable streams and to bring them to the drop-off facility (i.e. recycling or container park) to prevent this fraction from being incinerated with the residual waste, i.e. the part of the waste stream that remains after most recyclable streams have been separated. This paper focuses on the collection of plastic household waste in Flanders. In Europe, around 27.1 million Gg of plastic waste are collected every year (Plastics Europe). A little over 30% of such waste is recycled. The European recommendation on plastic recycling is currently 22.5% (and is expected to be 45–50% from 2025 through the amendment of Directive 94/62/EC on packaging and packaging waste and the European strategy for plastics in a circular economy (European Commission, 2015b, 2018). In Belgium, in 2016, 680 000 Gg or 87.4% of overall packaging material was recycled. Moreover, in Flanders, 53 000 Gg of plastic was recycled, of which 73% through the PMD bags (FostPlus). The blue PMD waste bags, initiated by the Belgian green

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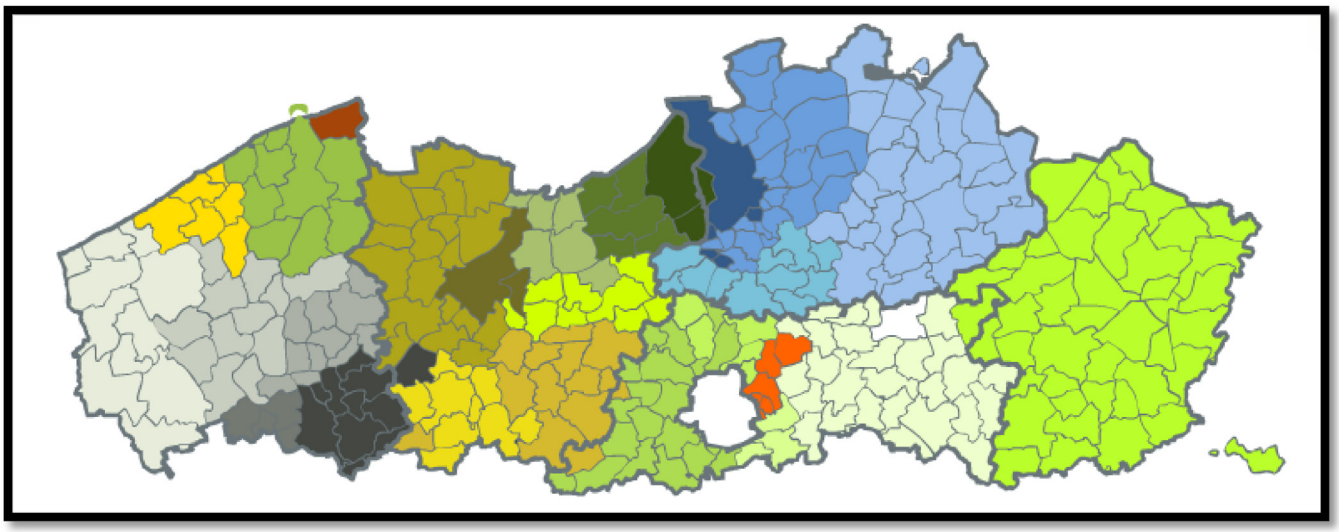

Fig. 1. Map of Flanders with supra-local joint ventures (same color is one joint venture). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

dot agency Fost Plus, contain Plastic bottles and containers (P), consisting of PolyEthylene Terephthalate (PET) and High-Density PolyEthylene (HDPE), Metal packaging (M) and Drinking cartons (D). Citizens hence separate these fractions from the residual household waste stream to optimize separation-at-source. It is within this context that the analysis in our paper is undertaken.

The Flemish government mandates source-separated collection throughout the region. In order to encourage improvements in separation, it also sets targets for per capita residual waste production, home composting, and maximum residuals, which must be met by all municipalities in the region.

There are regional differences in collection rates, caused by external variables such as population and income, for example, which cannot be controlled by municipalities. They can, on the other hand, control other, internal variables, such as financial triggers or separation schemes (i.e., schemes enabling the public to separate waste) at the municipal drop-off facility.

Source separation for recycling has been recognized as a way to achieve sustainable municipal solid waste (MSW) management. MSW source separation can be considered a very effective tool to enhance waste recycling. Source separation is the separation of MSW into several fractions at the source of generation, according to several material characteristics before further processing. The main act of source separation is done by the separation actors, i.e. citizens and recycling park supervisors. Few studies have evaluated the mechanism of source separation activity or the separation actors themselves, and even fewer quantification studies have been carried out (Yang et al., 2011). So far, case studies on separation and recycling have mostly focused on just a few municipalities (Dahlén et al., 2007; Ferreira et al., 2017; Lyas et al., 2005; Teixeira et al., 2014; Thomas, 2001; Tonglet et al., 2004a). Other studies rely on specific country conditions or on differences between countries (Berglund and Söderholm, 2003; Van Beukering and Bouman, 2001). In this paper we cover the whole region of Flanders with its 308 municipalities.

Plastic household waste in Flanders is collected through two channels. The first channel is the PMD waste bag, allowing citizens to separate Plastic bottles and containers (P), Metal packaging (M) and Drinking cartons (D) from the residual household waste. The kerbside collection system for PMD waste bags is well-known and well-practiced among citizens. The second channel is through separation and collection of rigid and soft plastics at drop-off facilities (known in Flanders as recycling parks). This study focuses on the second channel and analyses cross-sectional data from 2008 to 2012 for all Flemish municipalities, 308 in total.

Packaging is the producer's responsibility. Nearly all the companies that produce household packaging are grouped in the green dot agency FOST Plus. Each participating company pays a fee based on the type and amount of packaging they are responsible for upon introduction into the market. The organization funds the public collection, sorting, and recycling of these materials.

It must be noted that, in December 2017, Fost Plus (2017) announced that, as of 2019, the PMD fraction of household waste will be expanded to contain all plastic packaging waste. As such, the collection and separation of plastics in the recycling parks might change drastically, as some of the fractions will be separated at household level and collected at the kerbside.

Collection of waste at the recycling parks in Flanders has become more complex, as they collect more and more waste fractions separately. This complexity is also true for rigid packaging and non-packaging plastics, i.e. plastic waste, that is increasingly being collected in more separate fractions based on the technical recycling possibilities, the higher selling prices for better separated plastics, and the prevention of recycling of hazardous substances into future recyclables. Recyclable PVC (hard PVC) has been collected separately for many years, and now soft and rigid plastic is also often collected separately at the recycling parks. Recycling parks all share the same challenges with respect to collecting a fair quality for the different types of plastic and deciding which fractions to focus upon and how to increase the overall quantity collected. As a consequence, recycling initiatives and accompanying separation-at-source schemes are not uniform across Flanders. Over recent years, a total of 7 different plastic separation options at drop-off facilities have emerged in Flanders. The municipality's choice of separation scheme depends on the recycler and its recycling technologies, influencing the collection portfolio and, hence, the choice of scheme.

In summary, the focus of this paper is the collection of plastic household waste in Flanders with the aim of investigating which factors have a significant effect on the amount of separated plastics at drop-off facilities. In addition, we consider whether different separation schemes impact on the plastic separation rates differently. Moreover, as both external and internal variables differ across the 308 Flemish municipalities, it is necessary to include