

The potential net value creation of recycling non-household end-use plastics waste: A case study from the City of Ghent

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Introduction

A substantial quantity of non-household end-use plastics waste generated is often not recycled despite the fact that this type of waste has less contamination and promising recycling potential. However, a significant amount of non-household plastics waste still ends up in residual bin (often sent for energy recovery) due to the lack of waste management infrastructure, absence of specific legislation addressing this waste stream, and poor monitoring systems (Kleinhans et al. 2021; CPA, 2020; Horodytska et al. 2018; Hestin et al. 2017). The information on the quantities and qualities of this type of plastics waste is scarce, which makes it difficult to assess the feasibility of establishing a plastics recycling plant that would convert this type of waste to high valued products (as regranulates).

Plastics waste recycling however has received great attention in Europe. Initiatives like the Circular Plastics Alliance aims to boost the market for regranulates up to 10 million ton by 2025 (CPA, 2020). Non-household end-use plastics waste is crucial towards achieving such targets as it can contribute 10 – 30% to the total plastics recycling in Europe (Kleinhans et al. 2021). Thus, understanding the quantities and financial balance of non-household end-use plastics waste recycling is imperative.

Methodology

In this research, the quantity of non-household end-use plastics waste in Ghent and the nearby municipalities is estimated by a combined top-down approach (data source from statistical databases) and bottom-up approach (data collection based on sampling/survey). The information on quantities is combined with compositional analyses performed in the frame of the Interreg 2 Seas Program *Plasticity* project.

Based on the analysis on the plastics waste quantities and compositional analysis, the financial balance of recycling the generated plastics waste is calculated. Four recycling scenarios will be presented, in which different quantities of plastics films waste are processed together or separately from the rigid plastics waste at a recycling plant. Data from literature were used to develop the potential plastics waste recycling schemes and financial calculations, including the recycling parameters therein (i.e., recycling yield, energy usage, associated costs and revenue).

Results

The results indicates that around 4,800 ton plastics film (56 w%) and 3,500 ton rigid plastics (44 w%) waste might be generated annually from 7 NACE sectors in the City of Ghent. Three NACE sectors (NACE sector C. Manufacturing, F. Construction, and G. Wholesale and retail trade) generate more than 80% of the total plastics waste generated (Fig. 1). The compositional analysis of plastics film waste in the City of Ghent combined with literature suggest that this waste stream consist of 80 – 83% PE, 16 – 20% PP, and 0 – 1% other polymers. Moreover, a study from Hestin et al. (2017) shows that the average composition of non-household end-use rigid plastics waste is 63% HDPE, 20% PP, and 17% PET.

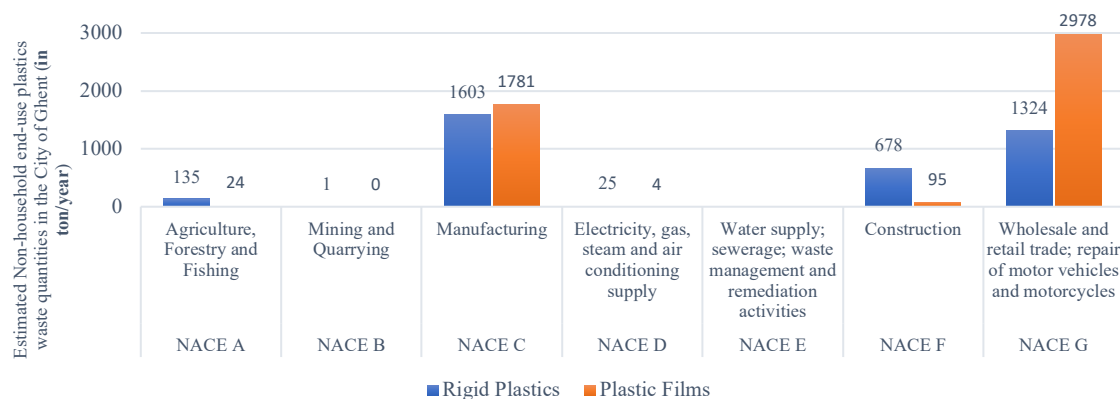


Figure 1 Quantities of non-household end-use plastics waste (rigid and films) in the City of Ghent

Through scenario analysis, we observe that a positive financial balance of recycling non-household end-use plastics waste might be accomplished when the scale of recycling plastic films can achieve over 11,000 ton (Fig. 2). It will be demonstrated that to reach the desired quantity, the masses available in the city itself can be combined with an additional 6,500 ton waste input by expanding the plastics film waste collection to 12 municipalities close to the City of Ghent.

This presentation will give a unique insight in the economies of scale of plastic film recycling from non-household waste. It will also be shown that non-household end-use plastics that are often forgotten within the plastics waste management strategies might have a promising business case for high quality recycling.

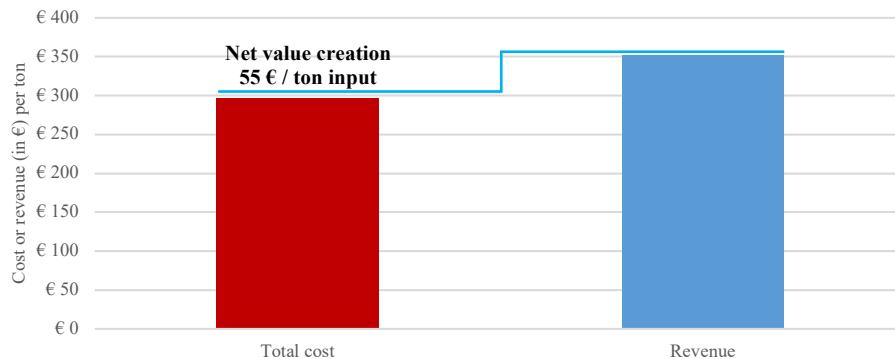


Figure 2 Financial balance and net value creation of recycling over 11,000 ton non-household end-use plastics films

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