

Towards Improved Circularity of Polyolefin-based Packaging

This project aims to analyze the technological hurdles for and provide background on the technical readiness of innovative technologies for mechanical and chemical recycling of plastics.



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Duration 2020-2022

Incentive

Plastics are present in many aspects of our daily lives, finding use in diverse products.

Nonetheless one cannot disregard the negative impacts plastic litter has on our environment. But plastics are far too valuable to be treated as waste. Once they have served their purpose, used plastic should be part of a circular value chain, upcycling them or as feedstock in the chemical industry.

Of the plastics currently produced in the Netherlands and used for packaging, only 35% are mechanically recycled, whereas 65% are incinerated with an associated CO₂-emission of 18 million tons. Both chemical recycling and mechanical recycling can have GHG emission advantages over incineration.

In order to achieve optimum utilization of waste plastic, both mechanical and chemical recycling needs to be applied. However, further technological development is required to make this economically feasible more broadly.

Objective

Despite the development and implementation of new and old technologies large scale implementation is still challenging. In this project, we analyze the technological hurdles for and provide background on the technical readiness of these technologies. Our focus is on emerging plastic sorting technologies and the chemical recycling of mixed polyolefin based plastic waste by pyrolysis and gasification in the context of a circular value chain. Thus we create better understanding of those technologies and generate insights that help close the complex loop for polyolefin-based plastic recycling.



Approach

- Sorting tests: waste stream composition of five different regions in Europe and most suitable recycling technologies.
- Evaluation of new analyzing techniques such as Raman spectroscopy, hyperspectral imaging and data analysis.
- Design for recycling in relation to emerging sorting techniques
- Analysis of chemical recycling: focus on quality
- Using our sorted and analyzed streams, we analyze chemical recycling (in particular pyrolysis and gasification) in more detail and as a part of a circular value chain.

Results

This project will result in:

- insights about the role of new and improved sorting techniques of plastic waste streams
- insights into criteria determining plastic waste stream suitability as feed for gasification or pyrolysis processes

