

Towards improved circularity of polyolefin-based packaging

Publieke samenvatting / Public summary

Aanleiding

In order to get full circularity of plastics both mechanical and chemical recycling needs to be applied, but based on the current knowledge it is not possible to make this economically feasible. Plastic waste is the feedstock for circularity, and the quality of the feedstock as well as of recycled products is crucial for market acceptance and economical as well as ecological success. Of the currently in the Netherlands produced olefins (precursors) used for packaging, only 30% is mechanically recycled, whereas 60% is incinerated with an associated CO₂ emission of 18 million tons. The percentage of mechanically recycled plastic packaging can be increased by improved sorting technologies, while the introduction of chemical recycling technologies such as gasification and pyrolysis will decrease the amount virgin feedstock needed resulting in a decrease of CO₂ emissions.

Doelstelling

There are plenty of technologies proposed and implemented at small scale for the mechanical and chemical recycling of plastics. However, large scale implementation is still challenging. In this collaboration, we will analyse the critical technological hurdles and provide fundamental background on the technical readiness with respect to new plastic sorting technologies and the chemical recycling of mixed (mainly polyolefin containing) plastic waste by pyrolysis and gasification in the context of the value chain. This will result in the necessary understanding of those technologies and

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will generate insights that will help closing the complex loop for polyolefin-based plastic recycling.

Korte omschrijving

In this project, separated post-consumer plastic waste streams from 5 different regions in Europe will be used for sorting tests. These sorted streams will be analysed in detail on chemical and physical aspects such as waste streams composition (which polymers, additives, contaminants, etc.) as well as recycling technologies most suitable for these waste streams. Mechanical recycling is often more cost-efficient and should initially be able to generate the most value, however, successive mechanical recycling will degenerate the material and eventually all materials become potential feed for chemical recycling. Therefore, it is important to assess what fractions of the aforementioned streams are to be used for chemical recycling (with a focus on pyrolysis and gasification). Fast and efficient sorting has been identified as a critical success factor to increase the recycle ratio of plastics. This is the reason why we will evaluate new analysing techniques (i.e. Raman spectroscopy, hyperspectral imaging, data analysis).

Resultaat

This project will result in what role new and improved sorting techniques of plastic waste streams and how pyrolysis and gasification as chemical recycling techniques of polyolefins-based packaging / mixed plastic can contribute to make full plastic recycling feasible. This will include the preparation for upscaling and implementing the examined technologies. By working together with all value chain partners they will get a very good perspective of their current and future role in the value chain. These results will be a relevant addition in the creation of a value chain to address and solve the issue of polyolefin-based plastic waste to be discarded and to be left unused or under-used (via incineration). Also, this will help develop a circular society in relation to the composition of the needed polyolefin-based plastics.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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