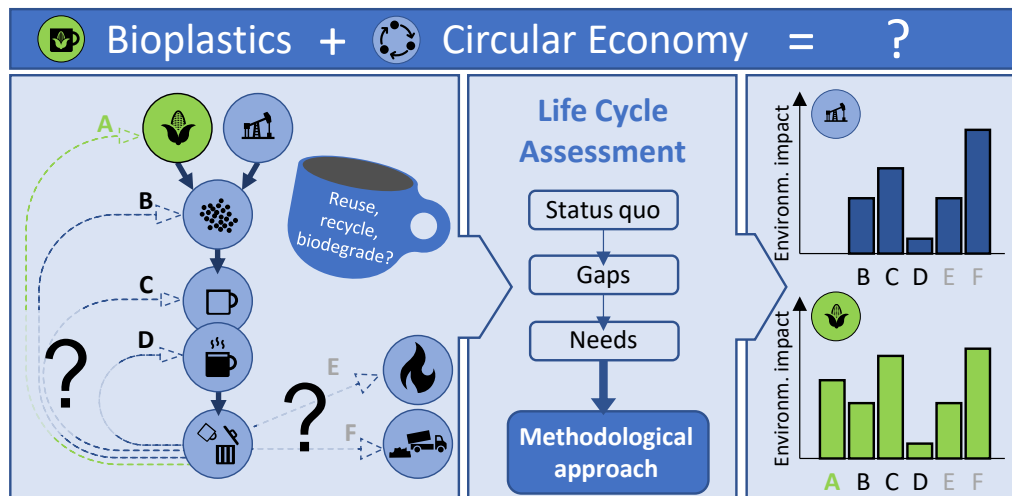




Name: Felicitas Pellengahr

Name of the project: Life Cycle Assessment of the biodegradation of bioplastics

Abstract of the project:



Plastic pollution on the micro and macro scale has become a serious concern in the public as well as the research world. In particular, plastics that are contaminated or consist of different materials are not integrated into a circular economy model. They end up in incineration or landfill because recycling is not technically or economically feasible. Not only is the material value of the plastic lost once it is landfilled but the landfilling practice was shown to also increase the risk of plastic leakage to the environment, aggravating the hazardous macro- and microplastic accumulation in nature.

Biodegradable plastics from renewable feedstocks are increasingly promoted for bringing several advantages when compared to the challenges caused by fossil-based non-biodegradable plastics. Renewable feedstocks for bioplastics include corn, sugar beet, and lignocellulosic materials and therefore, do not contribute to the exploitation of fossil resources but fix atmospheric carbon dioxide. Furthermore, biodegradable bioplastics open up a new possibility for end-of-life treatment of the plastic product through composting or anaerobic digestion. However, biodegradation is not always favorable from an environmental perspective as compared to other end-of-life options like recycling.

This leads to the question in which cases biodegradability does provide environmental benefits. The environmental performance of products and processes can be evaluated by performing Life Cycle Assessments (LCA). This research project aims to identify the current gaps in LCAs for modelling circular scenarios for (bio)plastics and to develop and apply an approach for bio-based products in different end-of-life scenarios, such as biodegradation and recycling, within the current and future circular economy.

Introduction of the ESR: I grew up in Berlin, Germany, and decided to go to the RWTH Aachen University for studying mechanical engineering in 2014. After finishing my bachelor's studies there in 2018 I specialized for my master's degree in plastics engineering. Additionally, I was able to work as a student research assistant in the field of Life Cycle Assessments of direct air capturing of carbon dioxide. For my master thesis, I explored the pH development during the degradation of polyester filaments both through a mathematical model and *in vitro* experiments. The experiences working on said thesis convinced me to pursue my way in research and, therefore, I am very lucky to be able to examine now the ecological impacts of the biodegradation of biobased plastics for my Ph.D. As I am a huge fan of plastics but also love our planet, I have strong compassion for the sustainability of plastics. So, let us not demonize but rather *rethink plastics in the most sustainable way*.

Keywords: Life Cycle Assessment, circularity, bio-based plastics, biodegradation, recycling

Contact details:

- Felicitas Pellengahr
- B4Plastics in collaboration with the Aachen Maastricht Institute of Biobased Materials
- IG Parklaan 2A, 3650 Dilsen-Stokkem, Belgium
- Phone: +32 (0)89 23 11 31
- felicitas.pellengahr@maastrichtuniversity.nl