LIFE CYCLE IMPACTS OF WEEE PLASTICS RECYCLING WITHIN THE PLAST2BCLEANED PROJECT

Spela Ferjan, TNO, Netherlands
spela.ferjan@tno.nl
Anna Schwarz, TNO, Netherlands
Toon van Harmelen, TNO, Netherlands

Key Words: Dissolution, WEEE plastics, Chemical recycling, LCA

The aim of the EU Horizon 2020 PLAST2bCLEANED project is to develop a recycling process for WEEE plastics in a technically feasible, environmentally sound, and economically viable manner. To fulfill this aim, PLAST2bCLEANED addresses the recycling of the most common WEEE plastics: Acrylonitrile Butadiene Styrene (ABS) and High Impact Polystyrene (HIPS). These materials contain up to 20wt% brominated flame retardants (BFR) and up to 5wt% of the synergist antimony trioxide (ATO). Therefore, PLAST2bCLEANED aims to close three material loops: (1) polymer, (2) bromine, and (3) ATO. With PLAST2bCLEANED technology, the WEEE plastics is first pretreated using a combination of innovative sensor-based and traditional sorting techniques. In the next step, the polymers containing BFR and ATO fractions are dissolved with a new dissolution process. The ATO and BFR are separated from the polymers and the solvents are recovered.
To assess the environmental impacts of the dissolution route developed within the PLAST2bCLEANED project, two perspectives have been used: The waste perspective (gate to grave) and the product perspective (cradle to gate).

The waste perspective will give insight into the impacts of processing WEEE plastics by the PLAST2bCLEANED dissolution process route. The product perspective will quantify the environmental impacts of using recycled ABS in a door frame of a washing machine and recycled HIPS in the inner liner of a fridge versus the use of virgin polymers. In this presentation, a detailed goal and scope definition of the LCA will be presented. Currently, the data collection for the full scan LCA is in progress. At the conference, the first LCA results are presented. In the quick scan, only the polymer loops (ABS and HIPS) are ‘closed’. The quick scan LCA already shows the environmental benefits of using recycled polymers compared to a virgin. Additionally, detailed results are given for the multiple process steps, including sorting and dissolution, to identify hotspots for environmental impact. For the closing of the BFR and ATO loop, potential environmental benefits are presented. Furthermore, sensitivities will be discussed to go from Quick scan to Full LCA, in particular on data needs and effects of scale.