

## E-Waste plastics valorization: A Symphony of Advanced Recycling Technologies

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In Europe alone, 2.6 million tons of waste from electrical and electronic equipment (WEEE) plastics were generated in 2021, but only 54% were collected through official channels. Of this collected amount, a mere 15% (0.4 million tons) reached specialized recycling companies. A significant portion of e-waste plastics (68%) have an unknown fate, raising serious concerns about unsafe recycling practices or improper disposal<sup>1</sup>. To address this critical challenge, the INCREASE project, promotes a collaborative approach for maximizing the recovery and utilization of recycled plastics from e-waste. The project advocates for a synergistic approach to advance recycling technologies, recognizing that different technologies can work in tandem rather than competing for the same materials.

In this work, we present the preliminary experimental results of a complementary recycling concept from sorting to application of advanced recycling technologies to real WEEE. Different WEEE streams were clustered, sorted and forwarded to the various advanced recycling technologies. The physical properties of the different sorted plastics were assessed for various recycling processes. It was demonstrated that solvent-based recycling can be used to reduce fillers, glass fibers and flame retardants from high density plastic fractions (> 1.0 g/cm<sup>3</sup>). With Near Infra-Red (NIR), the low density plastic stream was further sorted and pure PP fraction were separated and assessed for mechanical recycling. Low density fractions were pyrolyzed and the products evaluated to demonstrate that the rejected low density fraction of LHA can be chemically recycled to recover valuable oils for further upgrading to feedstock for steam crackers.

By adopting a collaborative and innovative approach, the INCREASE project aims to unlock the potential of e-waste plastics, creating a more resilient and digitized circular economy and ultimately contributing to a more sustainable future.

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<sup>1</sup> Haarman, A., Fedato, S. and Aubrey, H., 2023. Brominated Flame Retardants and the Circular Economy of WEEE Plastics. Report from BSEF–The International Bromine Council, State of Play.