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ANALYSIS OF INTRODUCING PLASTIC WASTE ENZYMATIC RECYCLING FOR SUSTAINABLE WASTE MANAGEMENT IN LATVIA

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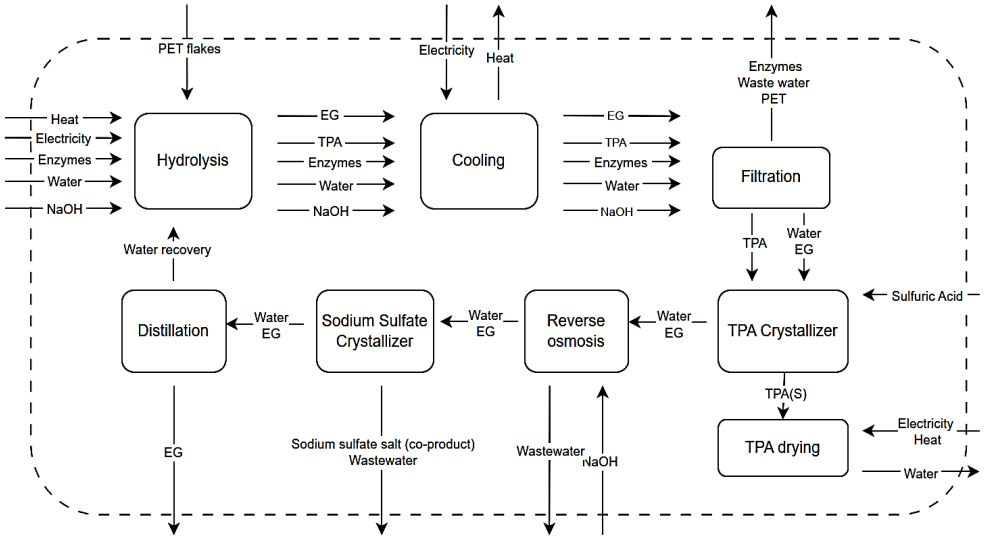
Abstract – Economic growth, urbanisation, and consumer consumption habits have contributed to the yearly increase in the municipal solid waste amount. A significant portion of household waste consists of plastic materials and packaging, which currently cannot be fully and endlessly recycled, does not decompose in nature, and degrades into micro- and nanoparticles entering the soil, air, aquatic environments, and organisms. According to an OECD report from 2022, the amount of plastic waste produced globally is expected to triple by 2060, with around half being landfilled and less than one-fifth being recycled. As waste volumes are going to increase, the need to ensure appropriate waste recycling technology is addressed in this study by introducing enzymatic plastic waste recycling in Latvia. Enzymatic recycling has an advantage over mechanical recycling technology because it can depolymerise plastics without degrading the quality of the material. The methodology applied in this study includes data analysis of the waste amount in Latvia, analysis of the existing plastic recycling plant operation, life cycle assessment of existing and proposed methods, and socio-economic impact evaluation. The proposed solution meets the objectives of promoting sustainable plastic waste recycling through the introduction of enzymatic recycling; therefore, it aligns with the European Union's targets to follow circular economy principles.

Keywords – Biological recycling; hydrolysis; life cycle assessment (LCA); municipal solid waste; plastic depolymerization; poly(ethylene terephthalate) (PET); terephthalic acid (TPA)



PET flake enzymatic recycling scheme.