



TECH 2019S9: Recycling of Mixed Plastics Waste

Recycling of Mixed Plastics Waste is one in a series of reports published as part of Nexant’s 2019 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

There are primarily two types of waste – pre-consumer and post-consumer waste. Pre-consumer (or industrial) waste is mostly already recycled, and is not a major problem. Post-consumer waste includes municipal solid waste (MSW), agricultural waste (typically contaminated with soil), electric and electronic waste, and end-of-life vehicle waste, which pose disposal problems. The post-consumer waste is typically mixed plastic waste.

The most commonly used methods for mixed plastic waste disposal are landfills, recycling, and incineration. Landfilling and incineration represent about 80 to 90 percent of waste disposal method globally. Landfilling is the most common method for waste disposal. Less than 10 percent of discarded plastics enter into the recycling stream in the United States, compared with about 40 percent in the European Union and 20 to 25 percent in China.

This TECH report provides an updated overview of the technological, economic, and market aspects of the recycling of mixed plastics waste. The following issues are addressed in this report:

- What are the major technologies for sorting/recycling of mixed plastics waste? Who are the major technology/equipment suppliers?
- How do the process economics compare across processes and different geographic regions?
- What are the different types of technologies for separation of the different layers in multilayer plastics?

Production Technologies

This TECH report focuses on the recycling of multilayer packaging, sorting of mixed plastics, compatibilization process and production of post-consumer plastics-asphalt mixtures.

Very few of the commodity plastics (i.e., HDPE, L/LLDPE, PS, PET, and PVC) are compatible beyond at best a few percent of another polymer. Optical sorting technologies are used for the separation of mixed plastics waste.

Compatibilizers are added to improve the interfacial adhesion between two incompatible polymers. Compatibilization is a process for improving a blend’s performance by making blend components less immiscible through the addition or in situ

generation of a macromolecular species that exhibits interfacial activity in both polymers.

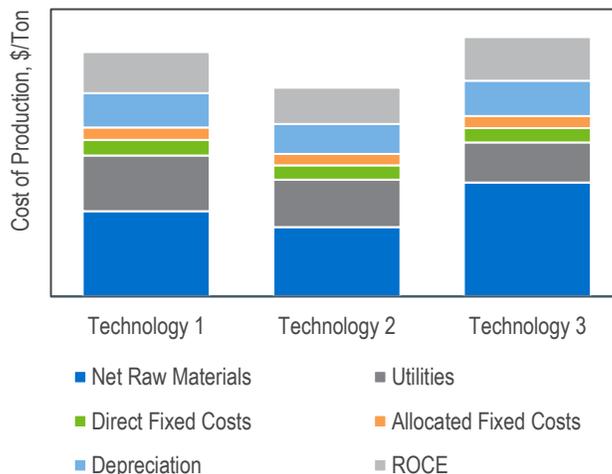
Selective extraction is a commonly known chemical purification. In this process, the different polymers in the multilayer packaging are dissolved at a certain temperature in a solvent, one after another.

Post-consumer plastic products such as waste plastic bottles, bags, wrappers made of HDPE or PP can be used in conventional bitumen, to produce a mixture of asphalt and plastic, which can be used in paving of roads.

Process Economics

Detailed cost of production estimates for various sorting technologies, and compatibilization process are presented for USGC, and Western Europe. Estimates are developed for NIR, laser and electrostatic separation technologies.

Sorting Technologies Production Costs



Commercial Overview

The report provides an overview and profiles of the major suppliers for optical sorting equipment, major suppliers of compatibilizers, and technology holders for selective dissolution process. A summary of recent developments in plastics roads is also provided.



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