

Conversion of Waste Plastic into Olefinic Building Block Molecules for Polymers

Plastics contribute to our current quality of life through applications such as agriculture, medicine, food packaging, and hygiene, to name a few. However, the ever more prevalent amount of waste plastic entering the environment is stimulating an interest into how to best arrive at a circular economy where common polymer (plastic) materials are recovered after use and converted back into materials for producing basic building blocks for polymeric materials.

This project will examine how to achieve this goal for 50,000 kilotons per year of waste plastic material assumed to be polyethylene, polypropylene and polystyrene with wood, paper, glass, metal, rubber and poly vinyl chloride already removed. The recovery facility will be located on the US Gulf Coast on a site offering ready access to provide a light liquid feed to one or more ethylene cracker complexes.

There are potentially several routes to achieve the project goals and there are a number of relevant patents. One of the first steps in executing this project should be a patent/technology review leading to a recommendation of which process to use as the basis of design.

Your work should include but not necessarily be limited to:

- Technology review and selection of which process to use as basis for design
- Validation of feedstock composition and quantity
- Preparation of Basic Engineering Design Data Sheet
- Preparation of Design Basis Memorandum
- Preparation of Project Execution Plan

Review/discussion of above with Project Sponsor to obtain approval to proceed

Define facilities for feedstock receipt and storage, feedstock preparation, feedstock conversion, gross and fine product recovery steps, product storage and shipping

Review with Project Sponsor to obtain approval to proceed

Prepare process flow diagrams and mass and energy balances for the facilities described above
Conceptual design of reactors, separation columns and vessels

Review with Project Sponsor to obtain approval to proceed

Pinch technology analysis for heat integration
Definition of utilities requirements

Review with Project Sponsor to obtain approval to proceed

Plot plan showing equipment siting for process steps and block area reservations for utilities and offsites

Review with Project Sponsor to obtain approval to proceed

Capital costing of facilities utilizing the FACT Method
Preliminary economic analysis

Review with Project Sponsor

Issue Final Report