

Techno-Economic Analysis of Combined Gasification Processes for Waste Plastic Resource Recycling

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As at August 2020, the estimated cost of processing 1,521,494 tons of waste plastic in the country is \$391 million, a technology is needed to efficiently deal with the large amounts of waste plastic produced. The capacity to process the quantity of waste plastic generated in the country is 50–100 ton/day, also processing waste plastic generates high amount of heat, which is a vital for energy generation. As a results of this, it has become necessary to propose an optimal gasification process model together with economic analysis for processing the waste plastic using basic design data from a research conducted by KIER. Five cases for processing the waste plastic using steam gasification were proposed in this study. Economic analyses were conducted for each case, and the most efficient case with respect to performance and economic feasibility was selected.

The results showed that the production of hydrogen is economically feasible in the process of waste plastic using steam-feed gasification. From the economic analysis of the hydrogen process, the annual revenue expected is \$9 million and \$10.7 million from the waste plastic resource recycling.