Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2022-51
Project Title:	Environment and Conservation Fund - Converting waste plastics into value-added products: process design, simulation, and feasibility analysis
Principal Investigator:	Dr Ren Jingzheng, Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University
Total Approved Grant:	$482,000
Duration:	1/9/2023 to 31/8/2025
Project Status/Remarks:	On-going
Project Scope:	There is an urgent treatment problem raised by waste plastics during the Covid-19 epidemic. In Hong Kong, the generation of waste plastic was 923.9 thousand tons in 2019, of which 846.8 thousand tons (91.7%) were disposed by landfills. Conventional landfills usually lead to tremendous environmental problems as well as occupying the limited land in Hong Kong. To promote the sustainable development of Hong Kong, converting waste plastics into value-added products to improve the recycling rate of waste can be a practical and promising solution. The gasification-based process for waste plastic treatment will be studied through rigorous computer-aided process simulation, data-driven optimisation, and comprehensive feasibility analysis, whose specific objectives are as follows: (a) developing innovative processes based on the primary thermochemical conversion and upgrading treatment technologies for converting waste plastic into energy or value-added chemicals, and having rigorous process simulation on these processes; (b) global multi-objective optimisation of the proposed processes which considers the sustainability objectives including the economic, environmental, exegetic, social, and safety aspects by using the validated simulation models; and (c) conducting the systematic feasibility analysis for the proposed utilisation schemes through the multi-criteria decision-making model which incorporates energy efficiency, economic cost and environmental sustainability simultaneously.
Summary of the Findings/ Outcomes:	To be available upon completion of the project