

Four-level economic potentials of three energy conversion pathways from empty fruit bunches

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Empty fruit bunches (EFB) are one of the most recent renewable energy resources. There are several pathways to convert low heat value EFB to useable energy forms such as bioconversion to produce liquid fuels (bioethanol and jet fuel), fast pyrolysis to make hydrocarbons, and gasification to generate combined heat and power (CHP). The objective of this study is to find the most profitable pathway among the three conversions. To achieve this objective, hierarchical four-level economic potentials (4-level EP) were used for a preliminary techno-economic analysis. The 4-level EP includes input/output structure, process flow structure, heat integration (HI), and economic feasibility. The EP approaches a more reliable value through the hierarchical 4-level EP. At the last level, economic criteria like return on investment (ROI), payback period (PBP), and net present value (NPV) are compared among the three pathways. The sensitivity of key variables is analyzed for the three cases to identify the influence of the key variables on the economic criteria.