

Process design and economic analysis for power generation via gasification from woodchips

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Gasification is regarded as becoming a main and effective technology for the thermo-chemical conversion of biomass to energy or synthetic gas (syngas). The objective of this study is to develop a conceptual design and evaluate economic feasibility of the fluidized-bed gasification process from woodchips for the electric power generation. To achieve these objectives, the woodchip electric power generation plant via gasification is modeled using a process simulator, Aspen plus. The plant includes five main areas: Feeding handing, gasification, cleaning of synthesis gas, power generation, and utilities. The total capital investment (TCI) of plant is estimated by applying the Chemical Engineering Plant Cost Index of 2009. The plant is economically analyzed in terms of the specific capital cost (SCC), the payback period (PBP), the return on investment (ROI), and the product value (PV). Sensitivity analysis is performed to identify key variables that have strong impact on PV.