ABSTRACT:

Biomass steam gasification with in-situ carbon dioxide capture using CaO exhibits good prospects for the production of hydrogen rich gas. In Malaysia, due to abundance of palm waste, it is a good candidate to be used as a feedstock for hydrogen production. The present work focuses on the mathematical modeling of detailed economic analysis and cost minimization of the flowsheet design for hydrogen production from palm waste using MATLAB. The influence of the operating parameters on the economics is performed. It is predicted that hydrogen cost decreasing by increasing both temperature and steam/biomass ratio. Meanwhile, the hydrogen cost increases when increasing sorbent/biomass ratio. Cost minimization solves to give optimum cost of 1.9105 USD/kg with hydrogen purity, hydrogen yield, hydrogen efficiency and thermodynamic efficiency are 79.9 mol%, 17.97 g/hr, 81.47% and 79.85% respectively. The results indicate that this system has the potential to offer low production cost for hydrogen production from palm waste.