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Development of a Decision Support Tool for Environmental and Economic Analysis of Biogas Systems based on Lignocellulosic Materials

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Abstract

Biogas production from agricultural residues is one option for generating cleaner energy and reducing waste. However, it is often difficult for investors to assess the viability of building a biogas plant due to technological, economic, as well as environmental factors, which complicate the preliminary design of the plant and hence, affect the return on investment of the project. To overcome this issue, this research proposed a decision support tool for estimating the environmental and economic assessment of biogas systems from lignocellulosic materials. The tool was categorized into five sections that are raw materials selection, biogas utilization options, technical selection, economic analysis, and environmental analysis. The system was validated with data obtained from three existing plants in Thailand and it showed promising results for practical use. Ultimately, this decision support tool will help investors narrow down the alternative solutions as per user requirements and prevailing conditions, whilst promoting sustainable development of biogas technology.

Keywords: economic impact, environmental impact, Thailand, cassava pulp, grasses