

Technoeconomic analysis of large-scale production of bioethanol from microalgae

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Abstrak

Presently, substantial progress has been made in advancing biofuel production to meets global energy demands and the adverse effects high fuel prices. However, food-derived bioethanol feedstocks have aroused social and environmental concerns. Chlorococcum sp., a microalgae strain with high carbohydrate content for fermentation feedstock, is a potential biomass for bioethanol production.

This study examines technical and economical feasibility of the production, which capitalise annual biomass of 50,000 tonnes over 10 years operating time. This study explores different technologies configuration at various production stages, where chosen technologies are mainly cost-effective, energy saving, and reliable for large-scale operation. With biomass cultivation in raceway pond, dual-stage flocculation preceding centrifugation dewatering, dilute acid pre-treatment, separate hydrolysis and fermentation, and purification, the overall production cost incurs at AU\$ 33 per litre bioethanol produced. The overall finding indicates that the project is technologically feasible, but not economically. Improving cultivation and dewatering can further reduce production cost hence the economic of microalgal bioethanol becomes more competitive and attractive.