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Title: The outlook of the production of advanced fuels and chemicals from integrated oil palm biomass biorefinery

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Abstract: The palm oil industry generates significant amounts of solid wastes. The solid wastes, also known as oil palm biomass, includes the trunk (OPT) and fronds (OPT) from the plantation, and empty fruit bunch (EFB), mesocarp fibre (MF) and palm kernel shell (PKS) from the processing mills. Oil palm biomass is not effectively recycled for other applications, and existing disposal practices can cause adverse impacts on the environment. As oil palm biomass is a readily available lignocellulosic biomass, it has the potential to be a low-cost feedstock for conversion into higher value products. The first part of this study provides a comprehensive review of utilisation of oil palm biomass for the production of biofuels, chemicals and biomaterials through direct utilisation and physical conversion, biochemical conversion, thermochemical conversion and synthesis of lignin-based materials. The second part of this study discusses the opportunity for biorefinery development based on existing bioproducts from oil palm biomass, for the production of advanced fuels and platform chemicals that have not been explored in oil palm biomass research. This study proposes integrated biorefinery concepts via the integration of existing oil palm biomass biorefinery products with thermochemical process for upgrading the bioproducts into higher values products. The high-value products integrated biorefinery products include advanced biofuels, fuel additives and platform chemicals. The integrated biorefinery development for oil palm biomass processing is expected to improve the economics of the production of biomass-derived renewable energy and enhance the sustainability of palm oil industry.

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