

Case study: preliminary assessment of integrated palm biomass biorefinery for bioethanol production utilizing non-food sugars from oil palm frond petiole

ABSTRACT

In this case study, a preliminary assessment on the bioethanol production from oil palm frond (OPF) petiole sugars within an integrated palm biomass biorefinery was carried out. Based on the case study of 4 neighbouring palm oil mills, approximately 55,600 t/y of fermentable sugars could be obtained from OPF petiole. The integrated biorefinery will be located at one of the 4 mills. The mill has potential excess energy comprising 3.64 GW h/y of electricity and 177,000 t/y of steam which are sufficient to run the biorefinery. With 33.9 million litres/y of bioethanol production, the specific production cost of bioethanol is estimated at \$ 0.52/l bioethanol, compared to \$ 0.3160.34/l bioethanol produced from sugarcane and \$ 0.4960.60/l bioethanol from other lignocellulosics. The net energy ratio of 7.48 for bioethanol production from OPF provides a promising alternative for OPF utilization as a non-food sugar feedstock.

Keyword: Bioethanol; Biofuel; Biorefinery; Non-food fermentable sugar; Oil palm frond petiole; Oil palm biomass