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Amelioration of Carbon Footprint Sensitivity within the Oil Palm Industry: The Chemical Engineer's Perspective

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High valued carbon stocks (HVCS) are established to nullify carbon emissions from the oil palm plantation (ENET,Y,PL,CPO) relative to crude palm oil (CPO) production (tonnes CO2eq per tonne CPO), estimated at an average of 13 tonnes CO2eq per tonne CPO. A yearly total of 19.5 tonnes biomass or 3.55 tonnes of HVCS is required per hectare to offset the emissions. The technological transition of energy generation by conventional diesel to sustainable biomass and biogas utilisation reduced emissions from 0.74 tonne CO2eq to 0.36 tonne CO2eq relative to each tonne of CPO in the palm oil mill. The emissions from the mill are discounted for its closed loop carbon cycle, with near net zero emissions (ENET) registered with respect to all sustainable technologies considered. The emission reduction is met with conditions of 25 years of plantation lifetime. The production of fresh fruit bunches must exceed 25 tonnes yearly per hectare with a minimum CPO production yield of 20 per cent. Furthermore, the use of HVCS shall not exceed 25 tonnes, with CPO and crude palm kernel oil (PKO) used as HVCS within the life cycle assessment (LCA) from the oil palm plantation to the palm oil mill gate. Net zero carbon emissions is approached upon consideration of emitted carbon dioxide returning to the oil palm plantation in the vicinity for assimilation.

Keywords: *Oil palm industry, palm oil mill, oil palm plantation, net zero emissions, life cycle assessment (LCA).*