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A proposal on leveraging excess electricity generated from oil palm biomass in a mobile battery energy storage system (POMBat) to power electric vehicles in Malaysia

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Previous studies showed that palm oil mills (POMs) in Malaysia could generate adequate biomass to produce power up to 5 MW per month. This potential has not been fully tapped due to many POMs located away from the main grid system and installation of new electricity distribution inter-connections cost USD 312,500 per kilometer. On the other hand, there is an opportunity to plan for additional electricity demand to cope with an expected 10% market penetration of electric vehicles (EVs) from total vehicle sales in Malaysia by 2030. Both issues could be solved by utilizing the excess electricity produced from a POM to charge a mobile battery energy storage system (POMBat) that can be used at EV fast charging stations (EVFCSs) located

along Malaysia's highways. Aspen Plus simulations on existing combined heat and power (CHP) systems in POMs indicated the availability of excess electricity when mesocarp fiber (MF) and empty fruit bunches (EFB) was used as biomass fuel. By utilizing this excess electricity to charge POMBats with a total capacity of 3000 kWh per day, 96 EVs can be charged daily without any additional burden to the national grid system. With large-scale adaptation of the POMBat across Malaysia, this system can potentially provide enough electricity to fast charge up to 200,000 EVs per year on Malaysia's highways and contribute to Malaysia's goal of 45% total GHG emission reduction by 2030 relative to 2005 levels.

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