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## The prospects and challenges of green energy production from oil palm processing wastes

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The demand and production of palm oil is increasing globally. Oil palm processing generates diverse and large volume of wastes, of which only a small fraction is utilized as energy source during processing. Biomass wastes generated during oil palm processing include solids such as empty fruit bunch (EFB), palm press fiber (PPF), palm kernel shell (PKS), and chaff, palm oil mill effluents (POME) and gaseous emissions. These wastes are typically dumped into the environment without treatment in many developing countries, which resulted in air, soil and water pollution. Utilizing these waste streams for bioenergy could generate wealth, while preventing environmental pollution. In many rural communities where these wastes are generated, lack steady power supply, cooking and transportation fuels. This study therefore focused on various energy carriers that can be generated from oil palm processing wastes including solid fuel (e.g., briquette, biochar), liquid (bioethanol, bio-methanol, biodiesel, bio-oil) and gaseous (bio-methane, biogas, bio-hydrogen) fuels and heat and/or electricity using diverse conversion technologies such as biochemical, physical and thermochemical including combustion, gasification and pyrolysis. However, waste to energy conversion is challenged by lack of policy framework for green energy especially in many developing countries and difficulty in gathering the biomass wastes that are generated by many dispersedly located small holder processors.

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