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## **Optimisation of energy and economic evaluation of palm waste utilisation in activated carbon and soil amendment**

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**P**alm oil processing generates lots of waste which are underutilised in some developing countries. It could be revaluated in activated carbon production for adsorption of impurities and acidic soil amendment. The economic and energy optimisation is necessary for determination of economic investment and cost-benefit analysis. Calculation of mass and energy balance, equipment sizing and cost estimation in major unit operations were performed. The economic analyses and process optimisation; were quantified and evaluated. Aspen Plus for process modeling and SPSS statistical tool for economic analysis. The outputs from the simulation were linked to economic analysis to determine an approximate return on investment, payback period and sensitivity analysis for optimised process. The results provide useful technology and economic information for investors, engineers and researchers as an alternative route for biomass utilization. The two processes have above 50% profit margin and 5-year investment recovery. Palm waste ash effect on the experimental soil for growing pepper was 14.7 tonnes/hectare at 8 tonnes/hectare application rate which is a good alternative to chemical fertilizer especially for the treatment of ultisol and acidic soils, this is most useful where the fertilizer market is not easily accessible. AC market is a viable business, though with high initial capital investment.

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