

## Use of Cassava Waste and Its Energy Potential

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**Abstract :** Fossil fuels have been the main source of global energy for many decades, accounting for about 80% of global energy need. This is beginning to change however with increasing concern about greenhouse gas emissions which comes mostly from fossil fuel combustion. Greenhouse gases such as carbon dioxide are responsible for stimulating climate change. As a result, there has been shift towards more clean and renewable energy sources of energy as a strategy for stemming greenhouse gas emission into the atmosphere. The production of bio-products such as bio-fuel, bio-electricity, bio-chemicals, and bio-heat etc. using biomass materials in accordance with the bio-refinery concept holds a great potential for reducing high dependence on fossil fuel and their resources. The bio-refinery concept promotes efficient utilisation of biomass material for the simultaneous production of a variety of products in order to minimize or eliminate waste materials. This will ultimately reduce greenhouse gas emissions into the environment. In Nigeria, cassava solid waste from cassava processing facilities has been identified as a vital feedstock for bio-refinery process. Cassava is generally a staple food in Nigeria and one of the most widely cultivated foodstuff by farmers across Nigeria. As a result, there is an abundant supply of cassava waste in Nigeria. In this study, the aim is to explore opportunities for converting cassava waste to a range of bio-products such as butanol, ethanol, electricity, heat, methanol, furfural etc. using a combination of biochemical, thermochemical and chemical conversion routes. . The best process scenario will be identified through the evaluation of economic analysis, energy efficiency, life cycle analysis and social impact. The study will be carried out by developing a model representing different process options for cassava waste conversion to useful products. The model will be developed using Aspen Plus process simulation software. Process economic analysis will be done using Aspen Icarus software. So far, comprehensive survey of literature has been conducted. This includes studies on conversion of cassava solid waste to a variety of bio-products using different conversion techniques, cassava waste production in Nigeria, modelling and simulation of waste conversion to useful products among others. Also, statistical distribution of cassava solid waste production in Nigeria has been established and key literatures with useful parameters for developing different cassava waste conversion process has been identified. In the future work, detailed modelling of the different process scenarios will be carried out and the models validated using data from literature and demonstration plants. A techno-economic comparison of the various process scenarios will be carried out to identify the best scenario using process economics, life cycle analysis, energy efficiency and social impact as the performance indexes.

**Keywords :** bio-refinery, cassava waste, energy, process modelling

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