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"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Empowering sustainable shea butter processing: A decentralised energy access solution for Burkina Faso

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Abstract

Shea (*Vitellaria paradoxa*), a native sub-Sahara African tree growing in dry-savannah regions is highly valued by the cosmetic, pharmaceutical, and food industries worldwide. However, due to inaccessibility to processing resources namely electricity and water, shea kernels grown in rural areas are exported to urban regions or abroad at extremely low prices. The shea kernels are there proceeded into highly-valued products i.e. shea butter and other refined sub-products. This study intends to design a sustainable and decentralised energy access-based solution for shea butter processing chain in rural regions. Considering current energy access portfolio trends in sub-Saharan Africa, solar photovoltaic has been targeted as the principal power technology. Shea butter extraction experiments were conducted under local conditions at an oil milling company in Toussiana, Burkina Faso. The electrical powering system was designed and sized using Homer Energy Pro software considering the connection of both the total loads and only critical loads of the processing facility. Sensitivity analysis was carried out based on the overall targeted shea butter production and unused excess electricity generated during off-processing periods of the year. Preliminary results show that a solar photovoltaic power system is effective for shea butter processing when production operations are carried out continuously throughout the year and during daytime. In addition, monitoring the efficiency of the appliances highlighted that up to 40 % of the required energy is saved by switching to efficient electrical motors and upgrading the wiring system. The research perspectives include cost-benefit analysis as well as supply and demand side monitoring to ensure power quality aspects to meet the IEEE 519–2014 standards.

Keywords: Economic feasibility, energy access, energy efficiency, shea butter

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