

DEVELOPMENT OF HYBRID RENEWABLE ENERGY SYSTEM FOR BASE TRANSCEIVER STATIONS IN REMOTE RURAL AREAS: A case of Chunya District- Mbeya Region.

By Mwakyoma Michael(2021)

A reliable, cost-effective power supply by considering availability, sustainability and viability of renewable energy sources was developed through evaluation of renewable energy resources, modelling and simulation of photovoltaic (pv) and wind turbines with energy storage backup. The complexity in simulation by using Homer software the continuous variables have informed the use of hybrid Genetic Algorithm and Pattern Search (h-GAPS) Technique. The simulation and finding a problem solution is treated as a single objective function by considering all objectives in terms of cost while constraining the HRES to satisfy the load demand safely according to the reliability criteria defined by the energy management strategy. Based on simulation peripheral node GSM BTS sites in remote rural areas, long-term (11-years) meteorological data at remote rural areas was collected and sated from NASA power viewer Agency compared to Tanzania Meteorological agency. Aimed effective performance indexes of various developed and existing energy systems are simulated and optimized based on economy or Cost of Energy (COE), cost - effectiveness, power systems reliability, sustainability energy throughout, and emission reduction targets. This research would be useful for mobile services providers, consultants, regulatory agencies, policy makers, and society.

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