



Optimization of a Biomass, solar and fuel cell Hybrid energy systems for a specific energy load using Homer Pro software®

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Abstract:This paper shows how HOMER Pro software simulates and optimizes a hybrid biomass energy system to can estimate the best option for a particular case of energy load.The main objective of this paper is to inform people what type of systems are the most effective to use in energy supply system and show how HOMER pro software works to simulate and optimize the different energy supply systems purposed.Thesystems have been simulated in HOMER Pro ® software which can estimate, simulate and optimize the operational costs and the emissions on energy systems using renewable energies. The simulation is integrated by a diesel generator with an output power of 15 kW, a fuel cell generator with an output power of 3 kW, a biogas generator with an output power of 3 kW, energy storage with a nominal capacity of 1.02 kWh, an inverter with a max. Output power of 1.15 kW and two photovoltaic systems with a max. Output power of 0.29 kW to supply a scaled annual average of 165.44 kWh/d. The data values obtained reveal that the total operational cost difference between the optimal system and the worst system is around 75%, the annual operation cost difference is around 64% and the kWh cost for the users takes a difference of 76%; and the reduction of CO₂ emissions take a value of 57% between the optimal system and the worst system. This confirm the importance of realize a simulation before design the system to use.

Keywords:Biomass, solar, fuel cell Hybrid energysystems, energy load, Homer Pro software.

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