

Optimal solar powered system for long houses in Sarawak by using homer tool

ABSTRACT

Ensuring electricity coverage for rural areas in Malaysia is still a big challenge due to the houses are in deep forest and scattered locations. The estimated coverage in 2015 is only 94% and still depending on conventional fossil-fuel generators. Considering full utilization of renewable source is highly recommended. Therefore, this paper proposes optimal design of full solar powered system for long houses in one selected area in Sarawak, Malaysia. Interestingly, the work has been started with evaluation and estimation of loads with site survey done to the selected area, which is Kampung Sungai Merah. The site visit has been conducted to survey and estimate the loads at the site. The design considers meteorological and climate data, specifications of system, and simulation configuration. HOMER tool is used in this work which comes with the optimization algorithm to search for the least cost system. The simulation results reveal the outcomes by considering three discount rates of 3%, 6% and 12%, and the system is presented with the best design for each rate. Lower discount rate contributes to higher PV and lower battery architectures as compared to higher discount rates. In short, it can be concluded that the system is optimally designed to be fully depended on utilization of solar as solid renewable source, which affects PV and battery architectures as two key design elements. Finally, this work should be able to provide the designer an opportunity to fully consider various options in developing the best renewable and full solar powered system for rural electrification.

Keyword: HOMER; Optimization; Photovoltaic; Renewable energy; Rural; Solar