

ABSTRACT

Rengit Island is one of the small islands that has become a tourist destination, located in the Bangka Belitung archipelago, Badau sub-district, Belitung district. Currently, the island has not reached the PLN electricity network, so the people there to meet their electricity needs still use sources from generators (Generator Sets), whose electricity production costs are more expensive than the electricity provided by PLN. In order to meet the electricity needs on Rengit Island, there are several options for planning an electrical solution, namely: using SKLTM (Medium Voltage Marine Cable Channel) 20 kV, PLTS, PLTD, PLTB, and Batteries. Planning using HOMER software will produce an optimal power plant composition with a minimum value of LCOE. Meanwhile, the DigSILENT software is used for system stability simulation if the results of the HOMER simulation include a VRE generator. System is said to be stable when the frequency stability does not exceed the standard regulation of the Menteri ESDM No 20 Tahun 2020, which is 49.0 Hz – 51.0 Hz.

In this study, the HOMER software produces a hybrid power plant (PLTH) option with the optimal generator configuration option: PLTS+PLTD+battery, with a minimum LCOE value of \$0.183. With the stability of the resulting system, the frequency fluctuated at 2,024 seconds at 50.029 Hz and decreased to 49.97 Hz in 2.234 seconds which then stabilized at 5,274 seconds with a frequency value of 49.98 Hz. The results of frequency stability are within the standard limits that have determined by the regulation of the Menteri ESDM No 20 Tahun 2020. Based on the research results, the optimal planning option for the PLTH system electrical solution can be applied to Rengit Island, Belitung.

Keywords: Rengit Island, Hybrid Power Plant, VRE Power Plant, System Stability.