

## ***ABSTRACT***

*Until now, the need for electrical energy in Indonesia has included primary needs. However, not all regions in Indonesia are connected to the PLN electricity network. Judging from the National Electrification Ratio in Indonesia until April 2020 it reached 98.93%, meaning that there are still 1.07% of areas that have not been connected to the PLN electricity network. Tunda Island, which is located in Banten Province, is one area that has not been connected to the PLN electricity network. The source of electrical energy on the island of Tunda only relies on independent Diesel Power Plant (PLTD), where the electricity produced is also very limited, only turns on at night. One of the solutions for Tunda Island is to optimize the use of PLTD by hybridizing PLTD with generators sourced from renewable energy.*

*In this research, the design and simulation of the control design of the PLTD hybrid system with the Solar Home System on Tunda Island will be designed using the Finite State Machine method. By utilizing electrical power from the Solar Home System and electrical power from PLTD, the two sources of electrical energy will be controlled to determine which energy source will be used to supply electricity to a house on Tunda Island in order to optimize the use of PLTD and to obtain output, which is in accordance with the load requirements on Pulau Tunda and must consider the reliability of the battery as optimally as possible.*

*The results of this study are not in the form of hardware, but this research can design and simulate the control design of the PLTD hybrid electric system with the Solar Home System to maximize the operation of the PLTD so as not to be wasteful of fuel use which will cause savings in the use of PLTD by 33.3% and get output stable electrical power that can meet at least 94% of the electricity demand on Pulau Tunda without stopping the supply to the load.*

***Keywords:*** PLTD, Finite State Machine, Solar Home System, Off-grid Hybrid