

## **ABSTRACT**

*Rengit Island is one of the small islands that expect to become a tourist destination in Indonesia which constrain by the availability of electrical energy. Currently, Rengit Island has not been reached by the PLN electricity network, so people use generators (Generator Sets) to meet their electricity needs at home, even though it is expensive. To overcome this problem, the solution is to build a Solar Power Plant (PLTS) to meet the electricity needs on the island of Rengit. The installation of PLTS requires good planning regarding solar irradiation and load requirements data. So, in this research, it will be shown how to do the laying of PLTS Pulau Regit using a spatial method based on power system analysis. By conducting simulations in the form of modeling using Geographic Information System software o map alternative generator positions, which will take several options to place the generator and DIgSiLIENT to analyze an electric power system in terms of power losses, a minimum voltage generated, and no overloaded line loading. The results of the simulation result in the placement of this PLTS in the form of an optimal power plant placement location, which is in zone 1 because based on the results of the simulation of power flow and short-circuit to obtain more optimal power losses with losses generated having a low value compared to other zones, which is  $2,0746724 \times 10^{-9}\%$  at night and  $2,5933401 \times 10^{-9}\%$  during the day. Losses is the difference between the injected power and the active power of the load, so the scenario of laying the power plant is technically feasible because the losses generated have a low value compared to other zones, resulting in a voltage at a value of safe limit, and then I break value is still below the maximum limit so that it meets the objective function.*

**Keywords:** *Spatial, PLTS, irradiation, power losses*