# *ABSTRACT*

*Renewable Energy (RE), which one of them is solar energy, has a trait called intermittent that is unstable or the energy is not always constant because depend on nature condition. Government release Rule of Ministry Energy and Mineral Resources (PERMEN ESDM) 49/2018 with purpose to lights up renewable energy (RE), which one of it is applying on-grid solar energy system, to achieve renewable energy at 23% in 2025. Design PLTS rooftop on home is needed an optimal cost planning to get optimal design in the matter of price.*

*Hence, in this final project an on-grid solar energy system is designed to has a Net Present Cost (NPC) 20 % lesser than fully supplied with PLN and Break Even Point (BEP) is also lesser than 15 years. This project research is done with getting load profile data on household type of 2200 VA directly and make it to be an input for simulation to get optimal cost based on NPC, that is, a cost analysis to decide feasible investment with based on interest and future cost and Break Even Point (BEP), that is, a point which expenditure with income is balance. Simulated solar panel has capacity 100Wp, 200Wp, and 300Wp. The simulation result shows that in 25 years project lifetime, solar panel installation 100Wp, 200Wp, and 300Wp have NPC 20% lesser compared to fully supplied with PLN and BEP is lesser than 15 years. The lowest value of NPC and BEP is gotten from 300Wp panel installation in amount of IDR 39,080,890 and 8.73 years respectively.*



**Keyword** : *Cost Optimization, On-Grid, Solar Energy, Solar Irradiation, Homer, Helioscope, NPC, BEP.*