Name: Angga Apriansyah
NPM: 123030116
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Title: Design of Solar Power Plants with Organic Rankine Cycle (ORC) System.

The need of electrical energy for doing daily activity both in industry and society is more increasing. It requires the availability of the greater electrical energy. Today, most of electrical energy needs sourced from fossil fuels which is the availability of them are diminishing. For increasing the availability of energy can be done by increasing the capacity of existing power plants or add new power plants with renewable energy sources.

Related to the issues above, through this research will be pursued a new power plants system design with Organic Rankine Cycle (ORC). Organic Rankine Cycle system that will be design itself utilizes solar energy source and isobutane as working fluid. Solar energy used for heating fluid such as water heaters. Air it used to evaporative isobutanewhich can evaporate at low temperatures and high pressure. So gas of isobutene can beused to rotate turbine shaft.

From the result of the research, there are ORC performance of a wide range of operating conditional. The highest ORC performance is in operational condition 3 (P = 8 Bar, T = 60 °C), it means the net power is 6.26 kW and cycle efficiency is 2.73 %.

Key Word: organic Rankine cycle, renewable energy, heat exchanger, the working fluid, net power, cycle efficiency.