

***Thermo Environmental Economic Study on Energy Conversion System Based  
on TEG SP1848 in the Cold Storage Politeknik Negeri Jember***

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***ABSTRACT***

*Thermoelectric generator is an alternative energy that utilizes temperature differences into electrical energy. The use of the TEG SP1848 thermoelectric which uses a heat source from the exhaust heat of a cold storage condenser requires thermodynamic, environmental thermal, and techno-economic analysis. The method used in this research process is a qualitative approach method with descriptive and evaluative methods. Thermodynamic analysis of the amount of heat wasted at each position of the engine pipe obtained  $T_1$  pipe 38613.47 Watts,  $T_2$  pipe 3960.35 Watts, and  $T_3$  pipe 39651.8 Watts. The SP1848-based TEG energy conversion device absorbs 11.14 watts of heat energy placed in the  $T_3$  pipe and has an efficiency of 0.23%. Analysis of the environmental conditions of the cold storage engine room based on the PMV, PPD, and THI values shows that the engine room environment is not comfortable for human activities and can disrupt the balance of human metabolism. The total investment cost for renewable energy conversion tools is Rp. 1.792.170,00. Techno-economic feasibility evaluation based on NPV and Payback Period produces a negative value, while BCR is 0.0012, indicating that the conversion tool is not feasible to run.*

**Key word:** *Condenser, Thermoelectric, Waste Heat, Environment, Economy.*