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Energy cost analysis of organic Rankine cycle with exhaust gas in off design conditions

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Abstract. Organic Rankine cycles (ORC) can be used for the conversion of heat to power. Generally, the heat source and heat sink temperatures are assumed to be constant in the theoretical analyses of ORC power plants. However, they fluctuate in real practice. In this study, the off-design simulations of an ORC power plant were conducted. The exhaust gas from a boiler of Suranaree University of Technology Hospital (SUTH) is used as a heat source with the temperatures in the range of 140 - 160°C. Also, the heat sink temperatures simulated are based on the weather of Nakhon Ratchasima province, Thailand. The maximum net power output, thermal efficiency, exergy efficiency was 5.23 kW, 9.21% and 29.37%, respectively. Levelized cost of energy (LCOE) of this study was 11.1769 Baht/kWh.

Keywords: organic Rankine cycle, off design, waste heat recovery, LCOE.