

Analisis teknis dan ekonomi model konfigurasi HRSG pada pembangkit listrik tenaga gas uap = Technical and economic analysis of HRSG configuration models on combined cycle power generation

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Abstrak

[ABSTRAK

Penelitian ini membahas tentang model konfigurasi HRSG (Heat Recovery Steam Generation) pada PLTGU (Pembangkit Listrik Tenaga Gas Uap). Dari model konfigurasi HRSG, diperoleh perbandingan nilai efisiensi termal, kapasitas daya, LCOE (Levelized Cost of Electricity) dan nilai keekonomian dengan pendekatan NPV (Net Present Value), IRR (Internal Rate of Return), PBP (Pay Back Period) dan sensitivitas keekonomian dari setiap model konfigurasi HRSG. Pengaruh tingkat tekanan HRSG 1P (one pressure), 2P (two pressure), dan 3P (three pressure) terhadap temperatur keluar turbin gas, analisis ekonomi dari perbandingan HRSG 2P, 3P, dan 3PHR (three pressure with reheater), dan analisis irrevesibel untuk tiga tekanan HRSG dengan pemanasan kembali dan pendinginan udara turbin gas pada PLTGU sudah diteliti. Pada penelitian ini, model konfigurasi HRSG yang dibandingkan antara lain; model konfigurasi HRSG, 1PRH, 2PRH, dan 3PRH. Model konfigurasi HRSG pada PLTGU disimulasikan dengan GateCycle Ver 6.0.0.2 dengan menggunakan turbin gas siemen V94.2. Hasil penelitian yang diperoleh antara lain; model konfigurasi HRSG 3PRH memiliki nilai efisiensi termal 5,59% lebih besar daripada model konfigurasi HRSG 1PRH dan 0,66% lebih besar daripada model konfigurasi HRSG 2PRH, model konfigurasi HRSG mempengaruhi nilai NPV, semakin besar nilai efisiensi termal dan kapasitas daya pembangkit listrik maka nilai NPV akan semakin besar, model konfigurasi HRSG 1PRH dengan interest rate 8.4% mempunyai PBP selama 8 tahun, sedangkan model konfigurasi HRSG 2PRH dan 3PRH mempunyai PBP selama 7 tahun, dan nilai tukar mata uang dan harga bahan bakar memiliki nilai sensitivitas yang tinggi terhadap nilai keekonomian apabila dibandingkan dengan nilai suku bunga bank dan biaya investasi.

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ABSTRACT

This paper presents HRSG (heat recovery steam generation) configuration models on CCGT (Combined Cycle Power Generation). In order to get the comparison of thermal efficiency, power capacity, LCOE (Levelized Cost of Electricity) and the economic value with approach NPV (Net Present Value), IRR (Internal Rate of Return), PBP (Pay Back Period), and economic sensitivity of each HRSG configuration models. The influence of the HRSG 1P (one pressure), 2P (two pressure) and 3P (three pressure) with the exit turbine gas temperature, the economic analysis of the

comparison HRSG 2P, 3P, and 3PHR (three pressure with reheater), and irreversible analysis of the three-pressure HRSG with reheating and cooling air to the gas turbine on CCGT have been investigated. In this paper, HRSG configuration models which is compared such as; configuration of HRSG 1PRH, 2PRH, and 3PRH. HRSG configuration models on CCGT simulated GateCycle Ver 6.0.0.2 with gas turbine siemen V94.2. The results of this paper obtained, such as; the configuration of HRSG 3PRH has thermal efficiency 5.59% greater than HRSG 1PRH and 0.66% greater than the HRSG 2PRH, HRSG configuration models have influence NPV, high thermal efficiency dan high power capacity shall have NPV higher than low thermal efficiency dan low power capacity, the configuration of HRSG 1PRH with interest rate of 8,4% has PBP for 8 years, while the HRSG 2PRH and 3PRH has PBP for 7 years, and the sensitivity factor for currency exchange rates and fuel prices have a high sensitivity to the economic value when compared with the interest rate and the investment cost.;This paper presents HRSG (heat recovery steam generation) configuration models on

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