

Abstrak

Tujuan yang diangkat dalam penelitian ini yaitu : a. Menghitung efisiensi energi pada sistem pembangkit listrik PLTGU Tambak Lorok; b. Menghitung efisiensi Gas Turbin Generator (GTG); c. Menghitung efisiensi Heat Recovery Steam Generator (HRSG); d. Menghitung efisiensi Steam Turbin Generator (STG).

Parameter dalam penelitian ini adalah kondisi beban 70 MW, 80 MW, 90 MW dan 100 MW. Variabel bebas adalah pola kerja mesin pembangkit listrik, yakni a. 2-2-1 (2GTG-2HRSG-1STG); b. 3-3-1 (3GTG-3HRSG-1STG). Variabel terikat adalah laju aliran, tekanan, temperature pada pada pembangkit listrik PLTGU, GTG, HRSG, STG. Analisa data dilakukan dengan cara membandingkan antara efisiensi *simple cycle* pada saat *combined* dan efisiensi *combined cycle* dengan beberapa pembebanan dan pola operasi PLTGU.

Hasil penelitian pada efisiensi PLTGU blok 1 dengan pola operasional 2-2-1 : a. Analisis Efisiensi PLTGU Pada Blok 1 Dengan Pola Operasional 2-2-1 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 42,90% - 44,35%; b. Analisis efisiensi Gas Turbin Generator 1 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 25,04% - 27,29%. Nilai efisiensi sistem Gas Turbin Generator 2 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 35,31% - 37,76%; c. Analisis efisiensi Heat Recovery Steam Generator 1 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 67,49% - 74,73%. Nilai efisiensi Heat Recovery Steam Generator 2 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 60,48% - 71,37%; d. Analisis efisiensi Steam Turbin Generator pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar antara 54,66% - 57,24%. Hasil penelitian pada Pada penelitian efisiensi PLTGU blok 2 dengan pola Operasi 3-3-1 : a. Analisis efisiensi PLTGU Pada blok 2 dengan pola operasi 3-3-1 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 38,16% - 40,56%; b. Analisis efisiensi Gas Turbin Generator 1 pada beban 70 MW, 80 MW, 90 MW dan 100 MW sebesar 94%. Nilai efisiensi Gas Turbin Generator 2 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 92,19% - 94,13%. Nilai Gas Turbin Generator 3 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 93,73% - 94,83%; c. Analisis efisiensi Heat Recovery Steam turbin 1 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 63,83% - 70,94%. Nilai efisiensi Heat Recovery Steam Generator 2 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 65,62% - 69,84%. Nilai efisiensi Heat Recovery Steam Generator 3 pada beban 70 MW, 80 MW, 90 MW dan 100 MW berkisar 64,43% - 73,59%; d. Analisis efisiensi Steam Turbin Generator pada beban 70 MW, 80 MW, 90 MW dan 100 MW sebesar 62%.

Kata Kunci : efisiensi, GTG, HRSG, STG, PLTGU.

Abstract

Objective raised in this study are: a. Calculating the energy efficiency of the power generation system PLTGU Tambak Lorok; b. Calculating the efficiency of Gas Turbine Generator (GTG); c. Calculating the efficiency of Heat Recovery Steam Generator (HRSG); d. Calculating the efficiency of Steam Turbine Generator (STG).

The parameters in this study is 70 MW, 80 MW, 90 MW and 100 MW. The independent variable was the work patterns of engine power, namely a. 2-2-1 (2GTG-2HRSG-1STG); b. 3-3-1 (3GTG-3HRSG-1STG). The dependent variable is the rate of flow, pressure, temperature in the PLTGU power plant, GTG, HRSG, STG. Data analysis is done by comparing the simple cycle efficiency when combined and efficiency combined cycle with several loading and patterns of power plant operation.

The results of the study on the efficiency of power plant operational pattern blocks 1 with 2-2-1: a. Efficiency Analysis of Combined Cycle Power Plant Block 1 With Pattern On Operational 2-2-1 on a load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 42.90% - 44.35%; b. Analysis of the efficiency of Gas Turbine Generator 1 at the load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 25.04% - 27.29%. Value system efficiency Gas Turbine Generator 2 on a load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 35.31% - 37.76%; c. Analysis of the efficiency of Heat Recovery Steam Generator 1 at a load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 67.49% - 74.73%. The efficiency value Heat Recovery Steam Generator 2 on a load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 60.48% - 71.37%; d. Analysis of Steam Turbine Generator efficiency at load of 70 MW, 80 MW, 90 MW and 100 MW ranging between 54.66% - 57.24%. Results of research on research efficiency power plant block 2 with a 3-3-1 Operation pattern: a. Analysis of efficiency PLTGU In block 2 with a pattern of 3-3-1 operations in the load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 38.16% - 40.56%; b. Analysis of the efficiency of Gas Turbine Generator 1 at the load of 70 MW, 80 MW, 90 MW and 100 MW by 94%. Rated efficiency Gas Turbine Generator 2 on a load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 92.19% - 94.13%. Value Gas Turbine Generator 3 at the load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 93.73% - 94.83%; c. Analysis of the efficiency of Heat Recovery Steam turbine 1 at the load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 63.83% - 70.94%. The efficiency value Heat Recovery Steam Generator 2 on a load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 65.62% - 69.84%. The efficiency value Heat Recovery Steam Generator 3 at the load of 70 MW, 80 MW, 90 MW and 100 MW ranging from 64.43% - 73.59%; d. Analysis of Steam Turbine Generator efficiency at load of 70 MW, 80 MW, 90 MW and 100 MW by 62%.

Keywords: efficiency, GTG, HRSG, STG, PLTGU.