ABSTRAK

HARTANTO TRI SUBEKTI. Analisis Kinerja Ups Modular Conceptpower DPA Pada Pembebanan Tiga Fasa Serta Simulasi Sistem Pendukung Daya Cadangan Genset Dan PLTS.

Dibimbing oleh SUGENG PURWANTO, S.T., M.Sc.

Penelitian ini bertujuan untuk menganalisis kinerja *Uninterruptible Power Supply* (UPS) modular Conceptpower DPA Newave/ABB pada pembebanan tiga fasa di PT Interlink Technology serta mengevaluasi alternatif sistem pendukung daya cadangan melalui skenario genset dan Pembangkit Listrik Tenaga Surya (PLTS). Kebutuhan terhadap kontinuitas suplai listrik menjadi aspek penting karena gangguan daya dapat memengaruhi keandalan beban kritis dan aktivitas operasional perusahaan. Metode penelitian yang digunakan meliputi studi literatur, observasi lapangan, pengumpulan data teknis UPS, analisis parameter operasional, serta simulasi perbandingan sistem daya cadangan. Analisis dilakukan berdasarkan parameter tegangan, arus, daya, frekuensi, kapasitas baterai, *backup time*, hasil *battery report*, serta perbandingan ekonomi menggunakan metode *Life Cycle Cost* (LCC) selama 10 tahun. Hasil penelitian menunjukkan bahwa sistem UPS eksisting secara umum masih layak beroperasi dan mampu menjaga kestabilan suplai daya. Namun, ditemukan ketidakseimbangan arus antarfasa sebesar 8,80%, sehingga distribusi beban perlu dievaluasi kembali. Seluruh unit baterai berstatus *PASS*, tetapi terdapat modul dengan *battery run time* terendah sebesar 46 menit, yang menunjukkan bahwa UPS lebih tepat digunakan sebagai sistem transisi daya jangka pendek. Dari aspek ekonomi dan lingkungan, skenario investasi PLTS + UPS menunjukkan nilai LCC yang lebih kompetitif dibandingkan skenario sewa genset + UPS dalam jangka panjang. Skenario genset menghasilkan emisi karbon sebesar 3,94 ton CO_2/tahun, sedangkan PLTS tidak menghasilkan emisi lokal saat beroperasi. Dengan demikian, kombinasi UPS dan PLTS dapat menjadi alternatif sistem pendukung daya cadangan yang lebih andal, ekonomis, dan ramah lingkungan.

Kata kunci: UPS, kapasitas baterai, kinerja operasional, Life Cycle Cost, PLTS, daya cadangan.

ABSTRACT

HARTANTO TRI SUBEKTI.. *Performance Analysis of the Conceptpower DPA Modular UPS under Three-Phase Loading and Simulation of Generator Set and Solar Photovoltaic Backup Power Support Systems.*

Supervised by SUGENG PURWANTO, S.T., M.Sc.

This study aims to analyze the performance of the Conceptpower DPA Newave/ABB modular Uninterruptible Power Supply (UPS) under three-phase loading at PT Interlink Technology and to evaluate alternative backup power support systems through generator set and Solar Photovoltaic (PV) scenarios. The need for continuous electricity supply is an important aspect because power disturbances can affect the reliability of critical loads and the company's operational activities. The research methods include literature study, field observation, UPS technical data collection, operational parameter analysis, and comparative simulation of backup power systems. The analysis was conducted based on voltage, current, power, frequency, battery capacity, backup time, battery report results, and economic comparison using the Life Cycle Cost (LCC) method over a 10-year period. The results show that the existing UPS system is generally still feasible to operate and is capable of maintaining power supply stability. However, a phase current imbalance of 8.80% was identified, indicating that the load distribution needs to be reevaluated. All battery units were recorded with a PASS status, although one module had the lowest battery run time of 46 minutes, indicating that the UPS is more suitable as a short-term power transition system. From economic and environmental perspectives, the PV investment + UPS scenario shows a more competitive LCC value than the generator set rental + UPS scenario in the long term. The generator set scenario produces carbon emissions of 3.94 tons CO_2/year, whereas the PV system does not generate local emissions during operation. Therefore, the combination of UPS and PV can serve as a more reliable, economical, and environmentally friendly alternative backup power support system.

Keywords: UPS, battery capacity, operational performance, Life Cycle Cost, photovoltaic system, backup power.