ANALISIS KEANDALAN SISTEM DISTRIBUSI 20KV PADA PENYULANG BANJARSAWAH DI PT PLN (PERSERO) ULP PROBOLINGGO MENGGUNAKAN METODE *RELIABLITY INDEX ASSESMENT*

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ABSTRAK

Penelitian ini menganalisis keandalan sistem distribusi listrik pada Penyulang Banjarsawah di wilayah kerja PT PLN (Persero) ULP Probolinggo. Tujuan utama adalah mengevaluasi kinerja sistem melalui perhitungan indeks keandalan SAIFI (System Average Interruption Frequency Index), SAIDI (System Average Interruption Duration Index), CAIDI (Customer Average Interruption Duration Index), dan MAIFI (Momentary Average Interruption Frequency Index) menggunakan metode Reliability Index Assessment (RIA) dan simulasi Electric Transient Analyzer Program (ETAP). Data gangguan tahun 2024 serta parameter teknis jaringan menjadi basis analisis. Hasilnya menunjukkan nilai SAIFI (0,45–3,11 gangguan/pelanggan/tahun), SAIDI (7,04–13,41 jam/pelanggan/tahun), dan CAIDI (0,06–4,30 jam/gangguan) lebih rendah dari standar SPLN 59:1985 (SAIFI: 3,21; SAIDI: 21,09; CAIDI: 6,57), mengindikasikan keandalan sistem yang baik. Namun, rekomendasi perbaikan infrastruktur dan mitigasi gangguan diajukan untuk optimasi kinerja. Simulasi ETAP memvalidasi temuan dengan hasil serupa (SAIFI: 3,11; SAIDI: 12,06). Penelitian ini memberikan dasar bagi peningkatan kualitas layanan dan menjadi referensi akademik/praktisi di bidang sistem distribusi.

Kata Kunci : Keandalan Sistem Distribusi Listrik, *Reliability Index Assessment* (RIA), Penyulang Banjarsawah, Simulasi ETAP.

RELIABILITY ANALYSIS OF 20KV DISTRIBUTION SYSTEM IN THE BANJARSAWAH FEEDER AT PT PLN (PERSERO) ULP PROBOLINGGO *USING THE RELIABILITY INDEX ASSESSMENT METHOD*

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ABSTRACT

This study analyzes the reliability of the electrical distribution system at the Banjarsawah Feeder under PT PLN (Persero) ULP Probolinggo. The primary objective is to evaluate system performance by calculating reliability indices—SAIFI (System Average Interruption Frequency Index), SAIDI (System Average Interruption Duration Index), CAIDI (Customer Average Interruption Duration Index), and MAIFI (Momentary Average Interruption Frequency Index)—using the Reliability Index Assessment (RIA) method and Electric Transient Analyzer Program (ETAP) simulation. Data from 2024 outages and technical network parameters form the basis of the analysis. Results show SAIFI (0.45–3.11 interruptions/customer/year), SAIDI (7.04–13.41 hours/customer/year), and CAIDI (0.06–4.30 hours/interruption) values lower than the SPLN 59:1985 standard (SAIFI: 3.21; SAIDI: 21.09; CAIDI: 6.57), indicating robust system reliability. However, infrastructure improvements and outage mitigation strategies are recommended for optimal performance. ETAP simulations validate the findings with consistent results (SAIFI: 3.11; SAIDI: 12.06). This research provides a foundation for enhancing service quality and serves as an academic/practical reference in distribution system engineering.

Keywords : *Power Distribution System Reliability, Reliability Index Assessment (RIA), Banjarsawah Feeder, ETAP Simulation.*