

ABSTRAK

WAHYU ABDUL GHOFUR.

Pemeliharaan Jaringan SUTM 20 kV Metode PDKB Untuk Menjaga Keandalan SAIDI dan SAIFI di PLN UP3 BANTEN UTARA

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Penelitian ini bertujuan untuk menganalisis kondisi keandalan Jaringan Tegangan Menengah (SUTM) 20 kV setelah optimalisasi metode Pemeliharaan Dalam Keadaan Bertegangan (PDKB), menilai efektivitas PDKB dalam menurunkan nilai SAIDI dan SAIFI, mengevaluasi pelaksanaan kegiatan pemeliharaan menggunakan metode PDKB, serta mengidentifikasi kendala yang muncul beserta rekomendasi peningkatan penerapannya. Keandalan sistem diukur menggunakan indikator SAIDI (System Average Interruption Duration Index) dan SAIFI (System Average Interruption Frequency Index) sebagai parameter utama kontinuitas pelayanan tenaga listrik. Penelitian ini menggunakan pendekatan deskriptif kuantitatif dengan menganalisis data bulanan SAIDI dan SAIFI dari Januari hingga Oktober. Nilai SAIDI yang tercatat berturut-turut adalah 6,8 menit/pelanggan (Januari), 4,8 (Februari), 4,1 (Maret), 3,5 (April), 6,7 (Mei), 13,9 (Juni), 14,0 (Juli), 13,2 (Agustus), 7,2 (September), dan 4,1 (Oktober). Nilai SAIDI tertinggi terjadi pada bulan Juli sebesar 14,0 menit/pelanggan, sedangkan nilai terendah terjadi pada bulan April sebesar 3,5 menit/pelanggan. Sementara itu, nilai SAIFI tercatat sebesar 0,1 kali/pelanggan (Januari), 0 (Februari), 0,1 (Maret), 0,1 (April), 0 (Mei), 0,1 (Juni), 0,2 (Juli), 0,1 (Agustus), 0,1 (September), dan 0 (Oktober). Nilai SAIFI tertinggi terjadi pada bulan Juli sebesar 0,2 kali/pelanggan, sedangkan beberapa bulan menunjukkan nilai 0 kali gangguan. Hasil analisis menunjukkan bahwa sebelum optimalisasi, permasalahan keandalan utama tercermin pada tingginya durasi pemadaman pada periode Juni–Agustus, yang ditunjukkan oleh peningkatan signifikan nilai SAIDI. Setelah optimalisasi metode PDKB, terjadi penurunan yang cukup signifikan pada bulan September (7,2 menit/pelanggan) dan Oktober (4,1 menit/pelanggan), sementara nilai SAIFI tetap relatif stabil. Tren ini menunjukkan bahwa penerapan PDKB efektif dalam menurunkan durasi pemadaman tanpa meningkatkan frekuensi gangguan. Evaluasi pelaksanaan di lapangan menunjukkan bahwa PDKB mampu meningkatkan keandalan jaringan apabila didukung oleh perencanaan yang sistematis, tenaga kerja bersertifikasi, peralatan yang memadai, serta penerapan prosedur keselamatan kerja yang ketat. Namun demikian, terdapat beberapa kendala dalam implementasinya, antara lain keterbatasan sumber daya manusia bersertifikasi, faktor cuaca, dan risiko keselamatan kerja yang tinggi. Oleh karena itu, diperlukan peningkatan pelatihan, penguatan manajemen risiko, serta evaluasi kinerja secara berkala untuk mengoptimalkan penerapan PDKB. Secara keseluruhan, optimalisasi metode PDKB memberikan kontribusi positif terhadap peningkatan keandalan jaringan distribusi 20 kV, khususnya dalam menurunkan nilai SAIDI dan menjaga stabilitas SAIFI, sehingga mendukung peningkatan mutu dan kontinuitas pelayanan tenaga listrik kepada pelanggan.

Kata Kunci : Keandalan Jaringan, SUTM 20 kV, PDKB, SAIDI, SAIFI, Distribusi Tenaga Listrik.

ABSTRACT

WAHYU ABDUL GHOFUR.

Maintenance of the 20 kV SUTM Network Using the PDKB Method to Maintain the Reliability of SAIDI and SAIFI at PLN UP3 BANTEN UTARA

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This study aims to analyze the reliability condition of the 20 kV Medium Voltage Distribution Network (SUTM) after optimizing the Live-Line Maintenance (PDKB) method, assess the effectiveness of PDKB in reducing SAIDI and SAIFI values, evaluate the implementation of maintenance activities using the PDKB method, and identify existing constraints along with recommendations for improving its implementation. System reliability is measured using SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index) as key performance indicators of service continuity. This research employed a descriptive quantitative approach by analyzing monthly SAIDI and SAIFI data from January to October. The SAIDI values recorded were 6.8 minutes/customer (January), 4.8 (February), 4.1 (March), 3.5 (April), 6.7 (May), 13.9 (June), 14.0 (July), 13.2 (August), 7.2 (September), and 4.1 (October). The highest SAIDI value occurred in July (14.0 minutes/customer), while the lowest occurred in April (3.5 minutes/customer). Meanwhile, the SAIFI values were 0.1 interruptions/customer (January), 0 (February), 0.1 (March), 0.1 (April), 0 (May), 0.1 (June), 0.2 (July), 0.1 (August), 0.1 (September), and 0 (October). The highest SAIFI value was recorded in July (0.2 interruptions/customer), whereas several months showed a value of 0 interruptions. The analysis indicates that prior to optimization, the reliability issue was primarily reflected in high outage duration during June–August, as evidenced by the significant increase in SAIDI values. Following the optimization of the PDKB method, a noticeable decline in SAIDI was observed in September (7.2 minutes/customer) and October (4.1 minutes/customer), while SAIFI remained relatively stable. This trend demonstrates that PDKB implementation effectively reduces outage duration without increasing interruption frequency. The evaluation of field implementation shows that PDKB enhances network reliability when supported by structured planning, certified personnel, adequate equipment, and strict adherence to safety procedures. However, several constraints were identified, including limited certified human resources, weather conditions, and high occupational safety risks. Therefore, continuous training, risk management strengthening, and periodic performance evaluation are recommended to maximize the effectiveness of PDKB implementation. Overall, the optimization of the PDKB method contributes positively to improving the reliability of the 20 kV distribution network, particularly in reducing SAIDI values and maintaining stable SAIFI performance, thereby enhancing the quality and continuity of electricity service to customers.

Keywords : *Network Reliability, 20 kV Distribution System, Live-Line Maintenance (PDKB), SAIDI, SAIFI, Power Distribution.*