

**REKONFIGURASI JARINGAN DISTRIBUSI 20KV DI PT. PLN  
(PERSERO) ULP KRUENG GEUKUEH DENGAN METODE  
*BINARY PARTICLE SWARM OPTIMIZATION (BPSO)***

**ABSTRAK**

Sistem listrik yang disediakan oleh PT. PLN (Persero) memainkan peran krusial dalam memenuhi kebutuhan energi listrik di Indonesia. Dengan pertumbuhan pesat permintaan energi, terutama dalam sektor industri, komersial, dan rumah tangga, tekanan semakin besar pada jaringan distribusi listrik untuk menjaga keandalan pasokan daya. Salah satu tantangan utama adalah rugi-rugi daya dalam jaringan distribusi 20 kV, yang mengakibatkan kerugian finansial yang signifikan bagi PT. PLN (Persero) dan memengaruhi kualitas layanan kepada pelanggan. Penelitian ini mengusulkan penggunaan metode *Binary Particle Swarm Optimization (BPSO)* untuk merancang ulang konfigurasi jaringan distribusi 20 kV dengan tujuan mengurangi rugi-rugi daya. Rekonfigurasi jaringan dilakukan dengan mengubah status kabel penghubung antar trafo distribusi, tetapi mempertahankan struktur jaringan radial dan memperhatikan batasan operasi. Metode BPSO mengoptimalkan topologi jaringan dengan meminimalkan kehilangan daya nyata. Penelitian ini dilakukan di PT. PLN (Persero) ULP Krueng Geukueh dengan menggunakan simulasi software *Electrical Transient Analyzer Program (ETAP)* versi 19.0.1 dan Matlab 2018b. Hasil penelitian menunjukkan bahwa rekonfigurasi berhasil mengurangi rugi daya nyata secara signifikan, dengan penurunan dari 19.732 menjadi 19.4 kW.

**Kata Kunci :** *Binary Particle Swarm Optimization (BPSO), ETAP, Matlab, Rekonfigurasi, Rugi-rugi daya*

# **Reconfiguration of 20kV Distribution Network at PT. PLN (Persero) ULP Krueng Geukueh Using Binary Particle Swarm Optimization (BPSO) Method**

## **ABSTRACT**

The electrical system provided by PT. PLN (Persero) plays a crucial role in meeting the electricity needs in Indonesia. With the rapid growth in energy demand, particularly in the industrial, commercial, and residential sectors, there is increasing pressure on the electrical distribution network to maintain reliable power supply. One of the main challenges is the power losses in the 20 kV distribution network, which results in significant financial losses for PT. PLN (Persero) and affects the quality of service to customers. This research proposes the use of the Binary Particle Swarm Optimization (BPSO) method to redesign the configuration of the 20 kV distribution network with the aim of reducing power losses. The network reconfiguration involves changing the status of the connecting cables between distribution transformers while maintaining the radial network structure and considering operational constraints. The BPSO method optimizes the network topology by minimizing real power losses. This study was conducted at PT. PLN (Persero) ULP Krueng Geukueh using simulation software Electrical Transient Analyzer Program (ETAP) version 19.0.1 and Matlab 2018b. The research findings indicate that the reconfiguration successfully reduced real power losses significantly, with a decrease from 19.732 to 19.4 kW. These results demonstrate that the proposed approach using the BPSO method for distribution network reconfiguration can effectively mitigate power losses and enhance overall system efficiency.

**Keywords :** Binary Particle Swarm Optimization (BPSO), ETAP, Matlab,  
Reconfiguration, Losses