

# **Improving distribution network resilience through automation, Distributed Energy Resources, and undergrounding**

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## **Abstract-**

**In recent years, natural disasters such as hurricanes Katrina and Sandy, or deliberate attacks on the power system, have highlighted the importance of a resilient power distribution system that can maximize the energy supply even in the most stressful situations. However, reinforcing the distribution power grid is very costly, and investment decisions must be adequately justified.**

**This paper proposes a single-stage multi-criteria optimization model to maximize the resilience of a distribution system through a series of investments while minimizing the total cost incurred. The assets to be invested in under this model are the installation of Remotely Controlled Switches (RCSs), Distributed Energy Resources (DERs) such as storage and photovoltaic units, and the undergrounding of overhead lines. The optimization method is based on a customized genetic algorithm that can be successfully applied to solve large-scale networks. To exemplify the application of the proposed optimization method, an actual distribution network is simulated under extreme weather conditions. The results obtained show how the different type of investments are prioritized and the importance of including managerial and logistic training in distribution companies to deal with extreme weather events.**

**Index Terms- Micro-grids; Resilience; Power distribution; Distribution network planning, distributed energy resources**

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