Feasibility Study of Distribution Network Automation



Overview

(PDF) Analysis of distribution network reliability based on. This study uses a variety of efficiency indicators, like automation coverage, fault detectio.

Key Takeaways

Distribution network automation is feasible through multi-agent systems and smart grid technologies, offering improved reliability, reduced losses, and optimized operational costs.

Overview of Distribution Network Automation

Distribution network automation involves integrating intelligent control systems, sensors, and communication technologies into medium voltage (MV) and low voltage (LV) networks to enable real-time monitoring, fault detection, and automated restoration. Traditional networks are largely passive, with manual switching and limited feedback from MV/LV levels, which delays fault isolation and restoration. Automation addresses these limitations by enabling automatic power restoration (APR) and automatic stand-by switching (ASS), improving system reliability and operational efficiency.

Feasibility Analysis



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Technical FeasibilityMulti-Agent Systems (MAS): MAS can detect faults, isolate affected sections, and restore power autonomously. They can also incorporate loss reduction algorithms without additional investment. Integration with Distributed Generation (DG): Automation systems can manage bidirectional power flows from renewable energy sources (RES), ensuring stable operation despite increased DG penetration.

Simulation Tools: Platforms like pandapower allow conversion of real network models for automated planning and probabilistic simulations, supporting large-scale feasibility studies.

Economic Feasibility

Initial Investment and Payback: Feasibility studies typically evaluate the capital cost of automation equipment versus expected savings from reduced outage times, lower operational costs, and improved energy efficiency. Cost Estimation: Automated planning tools can simulate thousands of scenarios to estimate reinforcement, reconfiguration, and extension costs for large networks, aiding strategic investment decisions.

Operational Benefits

Reliability Improvement: Automation reduces outage duration and frequency, enhancing customer satisfaction and regulatory compliance. Network Optimization: Automated systems support structural optimization, including reconfiguration and reinforcement planning, which improves load balancing and reduces losses. Scalability: Feasibility analyses can be generalized to other networks with similar characteristics, making automation adaptable to different regions and network sizes.

Case Studies and Applications

Thessaloniki, Greece: MAS implementation on a 20 kV underground network demonstrated improved reliability and potential for loss reduction without further investment. Germany: Large-scale automated distribution system planning assessed the integration of RES, network reinforcement costs, and smart grid technologies across multiple DSOs, highlighting the economic and technical viability of automation.

Conclusion

Feasibility studies indicate that distribution network automation is technically and economically viable, particularly when using MAS and smart grid technologies. Benefits include enhanced reliability, reduced operational costs, optimized network performance, and better integration of renewable energy sources. Automated planning and simulation tools are essential for evaluating large-scale implementations and supporting strategic decisions for DSOs.

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Article Content

(PDF) Analysis of distribution network reliability based on ...

This study uses a variety of efficiency indicators, like automation coverage, fault detection time, and consumer complaints, to discover the primary factors of network reliability.

(PDF) Feasibility study of the implementation of A.I. automation ...

In this paper, a multi agent system (MAS) initially developed for fault detection and power restoration is studied with respect to these issues. More specifically, a feasibility analysis is conducted regarding

Feasibility study of the implementation of A.I. automation techniques ...

In this work, the feasibility of a power distribution automation system of typical hardware requirements is investigated. More specifically, a Multi Agent System proposed in the literature is

Analysis of distribution network reliability based on distribution ...

This study investigates the influence of distribution automation on the dependability of electricity networks, concentrating on important functional metrics and their relationship with network

Feasibility study of the implementation of A.I. automation techniques ...

Article: Feasibility study of the implementation of A.I. automation techniques in modern power distribution networks

Analysis of the Application of Distribution Automation Technology in ...

This study explores the feasibility and practical effectiveness of distribution automation technology in enhancing power supply reliability, providing valuable reference materials and implementation

A feasibility study of electricity distribution automation

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Research on the Impacts of Distribution Network Automation on the ...

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Initially, this paper examines the current state of distribution automation technology and deliberates on its precise influence on the reliability of power supply, encompassing aspects such as fault

Research on the Impacts of Distribution Network Automation on the ...

The deployment of distribution network automation technology, which leverages the combined power of smart devices, communication networks, and automated control systems, enables continuous

Distribution Automation

Distribution network automation refers to the combination of modern electronic technology, communication technology, computer network technology with power system equipment, integrating

Distribution networks reliability assessment considering distributed ...

Several performance measures of reliability are developed in the literature. In this research, the NEPLAN Simulator reliability analysis module is used to determine all the reliability

Feasibility study of the implementation of A.I. automation techniques ...

More specifically, a feasibility analysis is conducted regarding the implementation of the MAS on a segment of the underground 20 kV power distribution network of the city of Thessaloniki,

Feasibility study of the implementation of A.I. automation techniques ...

These issues have demonstrated the importance of concepts such as power distribution automation and power loss reduction. Automation has been applied to power distribution networks in

Feasibility study of the implementation of A.I. automation ...

Semantic Scholar extracted view of "Feasibility study of the implementation of A.I. automation techniques in modern power distribution networks" by A. Bouhouras et al.

DAS_rep_final

1. Introduction The word Automation means doing the particular task automatically in a sequence with faster operation rate. This requires the use of microprocessor together with communication network

Design and Application of Automation System with the Distribution ...

The intelligent distribution network is an important foundation and support for the smart grid, and it has covered substations at all levels. The smart substation technology general provides the definition of a

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Microsoft Word

Tutorial on Distribution Automation The concept of distribution automation dates back to the 1970s. The main motivation was to use evolving computer and communications technology to improve operating

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