

Can mobile energy storage systems improve power distribution system resilience?

Abstract: With the spatial flexibility exchange across the network, mobile energy storage systems (MESSs) offer promising opportunities to elevate power distribution system resilience against emergencies.

How do mobile energy storage systems work?

Mobile energy storage systems work coordination with other resources. Regulation and control methods of resources generate a bilevel optimization model. Resilience of distribution network is enhanced through bilevel optimization. Optimized solutions can reduce load loss and voltage offset of distribution network.

What is a mobile energy storage system (mess)?

During emergencies via a shift in the produced energy, mobile energy storage systems (MESSs) can store excess energy on an island, and then use it in another location without sufficient energy supply and at another time, which provides high flexibility for distribution system operators to make disaster recovery decisions.

What is mobile energy storage?

Based on this, mobile energy storage is one of the most prominent solutions recently considered by the scientific and engineering communities to address the challenges of distribution systems.

How do different resource types affect mobile energy storage systems?

When different resource types are applied, the routing and scheduling of mobile energy storage systems change. (2) The scheduling strategies of various flexible resources and repair teams can reduce the voltage offset of power supply buses under to minimize load curtailment of the power distribution system.

What is the optimal scheduling model of mobile energy storage systems?

The optimal scheduling model of mobile energy storage systems is established. Mobile energy storage systems work coordination with other resources. Regulation and control methods of resources generate a bilevel optimization model. Resilience of distribution network is enhanced through bilevel optimization.

A mobile energy storage sharing mechanism is proposed to make full use of the spatial-temporal flexibility of mobile energy storage and improve the resilience of the PDS by optimizing the ...

The content of this paper is organised as follows: Section 2 describes an overview of ESSs, effective ESS strategies, appropriate ESS selection, and smart charging-discharging of ESSs from a distribution network viewpoint. In Section 3, the related literature on optimal ESS placement, sizing, and operation is reviewed from the viewpoints of distribution ...

With the rapid development of the national economy and urbanization, higher reliability is more necessary for the urban power distribution system [1], [2]. As a typical spatial-temporal flexible resource, mobile energy

storage (MES) provides emergency power supply in the blackout [3], which can shorten the outage time, decrease the outage loss, and ...

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Today, energy storage devices are not new to the power systems and are used for a variety of applications. Storage devices in the power systems can generally be categorized into two types of long-term with relatively low response time and short-term storage devices with fast response [1]. Each type of storage is capable of providing a specific set of applications, ...

This paper presents a day-ahead network operation strategy using a mobile energy storage system (MESS) and offline control PVs to minimize power curtailment. ... Y. Routing and scheduling of mobile power sources for distribution system resilience enhancement. IEEE Trans. Smart Grid 2019, 10, 5650-5662. [Google Scholar]

Three mobile energy storages are applied in Tianjin City to guarantee the power supply of important loads; Fujian Province develops the mobile energy storage station to alleviate the situations of ...

Abstract An optimal sizing method is proposed in this paper for mobile battery energy storage system (MBESS) in the distribution system with renewables. The optimization is formulated as a bi-objective problem, considering the reliability improvement and energy transaction saving, simultaneously. To evaluate the reliability of distribution system with ...

Mobile power sources (MPSs), including electric vehicle fleets, truck-mounted mobile energy storage systems, and mobile emergency generators, have great potential to enhance distribution system (DS) resilience against extreme weather events. However, their dispatch is not well investigated. This paper implements resilient routing and scheduling of MPSs via a two-stage ...

Mirzaei, M. A. et al. Network-constrained rail transportation and power system scheduling with mobile battery energy storage under a multi-objective two-stage stochastic programming. Int. J.

Spatio-temporal and power-energy controllability of the mobile battery energy storage system (MBESS) can offer various benefits, especially in distribution networks, if modeled and employed optimally. Accordingly, this paper presents a novel and efficient model for MBESS modeling and operation optimization in distribution networks.

Mobile energy storage (MES) has the flexibility to temporally and spatially shift energy, and the optimal configuration of MES shall significantly improve the active distribution network (ADN) operation economy and renewables consumption. In this study, an optimal planning model of MES is established for ADN with a goal of minimising the annual cost of a distribution system.

A novel restoration mechanism in PDSs for routing and scheduling of MESSs integrated with stochastic RESs to achieve agile system response and recovery in facing the aftermath of high-impact low-probability (HILP) incidents is developed. With the spatial flexibility exchange across the network, mobile energy storage systems (MESSs) offer promising ...

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The upper layer constructs a real-time price-based demand response mechanism for the load side to optimize the load distribution and derive the EV charging and discharging price; the middle layer takes into account the mobile energy storage characteristics of EV clusters and considers the EV orderly charging and discharging peak-shaving ...

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