Optimal dispatch of mobile energy storage vehicles

Can a mobile energy storage dispatch model reduce load curtailment?
However, it is inevitable to consider the complicated coupling relations of mobile energy storage, transportation network, and power grid, which can cause issues of complex modeling and low efficiency. To address that, this paper proposes a mobile energy storage dispatch model to minimize the load curtailment.

Can mobile energy storage systems improve resilience in post-disaster operations?
Distributed energy resources,especially mobile energy storage systems (MESS),play a crucial role in enhancing the resilience of electrical distribution networks. However,research is lackingon pre-positioning of MESS to enhance resilience,efficiency and electrical resource utilization in post-disaster operations.

What is mobile energy storage?
Mobile energy storage (MES) is a typical flexible resource,which can be used to provide an emergency power supply for the distribution system. However,it is inevitable to consider the complicated coupling relations of mobile energy storage,transportation network,and power grid,which can cause issues of complex modeling and low efficiency.

Can mobile energy storage systems be pre-allocated on a short-time scale?
The main contributions of this paper are summarized hereafter: (1) Propose a novel method to pre-allocate mobile energy storage systems on a short-time scale. This allows the MESS to quickly participate in post-disaster load recovery,reducing loss of load and improving the efficiency of the MESS.

How can mobile energy storage systems be improved?
Establishing a pre-positioning method for mobile energy storage systems. Modeling flexible resources and analyzing their supply capabilities. Coordinating the operation of mobile energy storage systems with other flexible resources. Enhancing the resilience of the distribution network through bi-level optimization.

What is the optimal dispatch of Mes?
The optimal dispatch of MES includes two aspects,i.e.,path planning and energy storage power dispatch. Path planning is to optimize the driving path and destination of MES,and energy storage power dispatch is to optimize the charge-discharge power strategies of MES.

Previous studies of EV dispatch had emphasized potential advantages to controllable load and energy storage units, such as orderly charging [27], vehicle-to-grid (V2G) [28], vehicle-to-load (V2L) [29], vehicle-to-vehicle (V2V) [30]. However, the potential of EVs as mobile energy storage units has not yet been fully exploited in the power system.

Current research on mobile energy storage system primarily focuses on improving the elasticity of ADN. Compared to stationary energy storage system (SESS), the mobile energy storage system is more flexible and

reliable [14], which can be moved to designated stations according to commands for power interaction.The mobile energy storage system can provide ...

In active distribution networks (ADNs), mobile energy storage vehicles (MESVs) can not only reduce power losses, ... In this article, a multiobjective optimal MESV dispatch model is established to minimize the power loss, renewable energy source curtailment ...

In active distribution networks (ADNs), mobile energy storage vehicles (MESVs) can not only reduce power losses, shave peak loads, and accommodate renewable energy but also connect to any mobile ...

applied the multi-agent consensus algorithm to achieve the optimal allocation among different clusters. Therefore, the control strategy realized the two-way communication ...

With the increasing global energy crisis and global warming, much attention has been given to utilizing CCHP [1, 2].Also, the deployment of renewable energy technologies in power systems will increase for several reasons, including lower energy prices, less carbon emissions, and enhanced system reliability and flexibility [3, 4].The growing capacity of RES, ...

Electrochemical energy storage has a wide range of applications in modern society, including electric vehicles, renewable energy storage, and so on. ... Optimal dispatch of integrated energy system based on deep reinforcement learning. Energy Rep, 9 (2023), pp. 373-378.

The second part is the investigation and selection of highway MESS, which mainly includes operation and maintenance cost, dispatch loss, dispatch capacity and energy storage station setting. MESS mainly uses operation and maintenance vehicles to perform energy dispatch between various MGs to compensate RES and load uncertainty change.

With the rapid development of distributed generation (DG), battery energy storage systems (BESSs) will play a critical role in supporting the high penetration of renewable DG in distribution networks. The traditional dispatching approach of BESSs commonly adopts linear models with constant operational characteristics and neglects the aging cost. However, the operational ...

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EVs effectively act as mobile energy storage units. Vehicle-to-grid (V2G) technologies allow EVs to not only take power from the grid but also potentially feed it back during times of high demand. With the potential to operate in the V2G-mode, EVs are regarded as grid-support services under the fleet operator framework. ... The optimal dispatch ...

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Energy storage systems (ESS) are necessary to optimize the operation cost and increase the flexibility of IES with the natural gas network consisting of a CCHP system. Energy storage systems, including TES and EES, effectively reduce gas emissions and increase energy efficiency and system flexibility in the presence of RES [23].

Mobile power sources (MPSs), consisting of plug-in electric vehicles (PEV), mobile energy storage systems (MESSs), and mobile emergency generators (MEGs), can be taken into account as the flexible sources to enhance the resilience of DSs [9], [16]. In comparison with other resilience response strategies, the MESSs have various advantages.

Additionally, electric vehicles (EVs), as an impact load, could severely affect the safe dispatch of the microgrid. ... EVs can be regarded as mobile energy storage device participating in the operation of the microgrid, that could become the impact load on the demand side. ... Multi-objective optimal load dispatch of microgrid with stochastic ...

The emergence of electric vehicle energy storage (EVES) offers mobile energy storage capacity for flexible and quick responding storage options based on Vehicle-to-Grid (V2G) mode [17], [18]. ... This paper focuses on optimal energy and reserve dispatch in VPP system which comprises of decentralized energy resources, as depicted in Fig. 1. The ...

Aiming at the problem that existing trailer-based battery energy storage and hydrogen transportation models are often not considered and unified at the same time, this ...

In active distribution networks (ADNs), mobile energy storage vehicles (MESVs) can not only reduce power losses, shave peak loads, and accommodate renewable energy but al IEEE Systems Journal (2023)

With the depletion of fossil fuels and low-carbon emission requirements [1], the integrated energy system (IES) has attracted a lot of attention for its high efficiency and environmental friendliness.Extensive studies have been carried out on the IES for multi-energy conversion technology [2, 3], dynamic transmission analysis [4], unified energy flow calculation ...

Plug-in electric vehicles (PEVs) tend to be treated as a new form of the mobile energy storage system with the potentiality to promote energy management in microgrids (MGs) and smart grid. However, a conflict of interest exists regarding the optimal capacity configuration and the optimal economic dispatch of PEVs. On one hand, MGs can maximize their benefits ...

The battery of EV can be treated as a kind of mobile distributed energy storage device based on the vehicle-to-grid (V2G) (Guille and Gross, 2009, Kempton and Tomi?, 2005) mode, which can absorb electric power from and feedback the power to the main power grid. Therefore, EV can participate in the operation and control of the microgrid.

Optimal dispatch of mobile energy storage vehicles

The mobile energy storage system with high flexibility, strong adaptability and low cost will be an important way to improve new energy consumption and ensure power supply. It will also become an important part ...

In active distribution networks (ADNs), mobile energy storage vehicles (MESVs) can not only reduce power losses, shave peak loads, and accommodate renewable energy but also connect to any mobile energy storage station bus for operation, making them more flexible than energy storage stations. In this article, a multiobjective optimal MESV dispatch model is established to ...

a progressive hedging (PH) algorithm. In [20], a mix of mobile energy generation and storage systems (MEGSSs) is proposed to serve commercial customers aiming at maximizing the eco-nomic profitability. The optimal dispatch of a fleet of MEGSSs to supply power to customers who require alternative sources of power during peak time is developed.

A mobile energy storage system (MESS) could provide several services to the distribution systems such as reactive power support, renewable energy integration, peak shaving, and ...

Coordinated Planning of EV Charging Stations and Mobile Energy Storage Vehicles in Highways With Traffic Flow Modeling. Authors: Yongxi Zhang ... He, W. Liu, and M. Liu, "Multiobjective optimal dispatch of mobile energy storage vehicles in active distribution networks," IEEE Syst. J., vol. 17, no. 1, pp. 804-815, Mar. 2023. 10.1109/JSYST ...

As Renewable Distributed Generators (RDGs) such as Wind Turbines (WTs), Photovoltaics (PVs), and Waste-to-Energy (WtE) are increasingly integrated into distribution networks, along with the addition of Energy Storage Systems (ESSs), these networks have transformed into systems rich with controllable resources [1].The challenge now lies in ...

The main objective of the proposed approach is to dispatch the MESS in conjunction with optimal EVs" charging coordination to minimize operational costs and address the extra demand of PLs.

Scholars domestic and abroad have conducted a lot of studies on microgrids containing multiple energy situations. Bu et al., 2023, Xu et al., 2018 studied the optimal economic dispatch and capacity allocation of a combined supply system based on wind, gas, and storage multi-energy complementary to improve the energy utilization efficiency with the objective of ...

Upper and lower limits of the electric vehicle energy v. c. Coefficient vector for the objective function. C i. ... Spatial-temporal optimal dispatch of mobile energy storage for emergency power supply. Energy Rep, 8 (2022), pp. 322-329. View PDF View article View in Scopus Google Scholar

Scheduling mobile energy storage vehicles (MESVs) to consume renewable energy is a promising way to

balance supply and demand. Therefore, leveraging the spatiotemporal transferable characteristics of MESVs and EVs for energy, we propose a co-optimization method for the EV charging scheme and MESV scheduling on the highway, considering ...

Path planning is to optimize the driving path and destination of MES, and energy storage power dispatch is to optimize the charge-discharge power strategies of MES. A mixed ...

Mobile Energy Storage Systems (MESS) offer versatile solutions, aiding distribution systems with reactive power, renewables integration, and peak shaving. An MESS ...

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