

MITEI's three-year Future of Energy Storage study explored the role that energy storage can play in fighting climate change and in the global adoption of clean energy grids. Replacing fossil fuel-based power generation with power generation from wind and solar resources is a key strategy for decarbonizing electricity. Storage enables electricity systems to remain in... [Read more](#)

There are three major challenges to the broad implementation of energy storage systems (ESSs) in urban rail transit: maximizing the absorption of regenerative braking power, enabling online global optimal control, and ensuring algorithm portability. To address these problems, a coordinated control framework between onboard and wayside ESSs is proposed ...

On-board energy storage devices (OESD) and energy-efficient train timetabling (EETT) are considered two effective ways to improve the usage rate of regenerative braking energy (RBE) of subway trains.

A problem of peak power in DC-electrified railway systems is mainly caused by train power demand during acceleration. If this power is reduced, substation peak power will be significantly decreased. This paper presents a study on optimal energy saving in DC-electrified railway with on-board energy storage system (OBESS) by using peak demand cutting strategy ...

Running the energy storage device on board of a tram brings additionally following benefits: (i) a dramatic reduction of the peak power demand (ii) catenary free operation“; on several hundred ...

For improving the energy efficiency of railway systems, onboard energy storage devices (OESDs) have been applied to assist the traction and recover the regenerative energy. This article aims to address the optimal sizing problem of OESDs to minimize the catenary energy consumption for practical train operations. By employing a mixed-integer linear programming ...

1 Introduction. Modern railways feeding systems, similar to other conventional power delivery infrastructures, are rapidly evolving including new technologies and devices [] most of the cases, this evolution relates to the inclusion of modern power electronics and energy storage devices into the networks [2, 3] or in vehicles [].Nonetheless, some researchers are ...

The current environmental problems are becoming more and more serious. In dense urban areas and areas with large populations, exhaust fumes from vehicles have become a major source of air pollution [1].According to a case study in Serbia, as the number of vehicles increased the emission of pollutants in the air increased accordingly, and research on energy ...

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Xuan Liu, Kang Li, Energy storage devices in electrified railway systems: A review, Transportation Safety and ... respectively. The test results revealed that with one 0.28 kWh EDLC ESS installed on-board, 8% of regenerative energy from the motor was recovered ... voltage and current of this ESS were 76.12 kWh, 1650 V and 1200 A, respectively. ...

An energy storage system (ESS) in electric railways can be installed on a train, at trackside, or at substations. The main purpose of the ESS application is to reduce energy demand and peak power with good voltage regulation. This paper presents a control strategy for efficient regenerative braking of a vehicle equipped with an on-board ESS (OBESS) and evaluates the ...

With the rapid development of energy storage devices (ESDs), this paper aims to develop an integrated optimization model to obtain the speed trajectory with the constraint of on-board ESD properties such as capacity, initial state of energy (SOE), and the degradation of the on-board ESD. ... in the case with on-board ESD, more than 11.6% of net ...

2 Fig. 1. Schematic of the energy flow for a typical train with on-board ESD in the whole journey. The work is extended in [13] and the monotonicity assumption is avoided by the proposed distance-

These simulations have obtained an estimation of the charge of the energy storage device, which is needed to design the set of ATO speed profiles in scenarios with an on-board energy storage device installed. Table 6.1 shows the value of the on-board energy storage device charge for one interstation with different initial charge conditions ...

This paper aims to provide a comparative study on the hydrogen economy performance of fuel-cell hybrid trains (FHT) with energy storage devices (ESDs) to further investigate the suitability of each ESDs on a 1.8-km journey employing a time-based mixed-integer linear programming (MILP) model, the energy management strategy is optimized to ...

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