

# ENERGY STORAGE DEVICE FOR ITALY

## METRO LINE 5



What is a wayside energy storage system? In the case of wayside proposals, the wayside energy storage systems (WESSs) technology is introduced. The wayside units can be installed in an existing TPS and integrated with present traction power equipment. Otherwise, they can be allocated in new TPSs, as part of a line extension, or in passenger station areas.



Should energy storage equipment be installed in the RSO's power system? The first results carried out on real case studies can be very promising, evidencing peaks of about 38.5% of total energy sold back to the grid. Differently, the installation of energy storage equipment in the RSO's power system can be considered. ???on-board??? and ???wayside??? solutions are widely proposed [8 - 11].



Can superconducting magnetic energy storage be used in rail storage systems? Solutions for rail storage systems were widely proposed and compared, with special regards to the storage technologies of electrochemical batteries, electrical double layer capacitor (EDLC) (i.e. supercapacitors), and flywheels. Superconducting magnetic energy storages are still in the experimental stage.



How does a railway storage unit work? The storage unit is connected to the railway system via a breaker and a DC/DC power converter (an insulated gate bipolar transistor (IGBT)-based chopper typically) is represented. WESS representative scheme



Are EDLC batteries better than single energy storage devices? EDLCs can combine their power discharge characteristics with energy storage properties of batteries forming the so-called ???hybrid energy storage unit???, which present better performances, high duty cycle, and low maintenance in comparison with the single energy storage devices.

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Abstract A method for estimating the parameters of the autonomous running of electric rolling stock is proposed, which incorporates analysis of the weight of a railway train, ???



The paper investigates the installation of energy storage systems (ESS) for a 3kV DC railway line located in the North of Italy. The main goals are to compensate voltage drops along the line ???



The optimization results are shown in Fig. 5. The battery energy storage device enhances the cost-effectiveness of system I by leveraging the electricity price variance. is ???



To make more rational use of RBE, inverter, supercapacitor energy storage, flywheel energy storage, and other technologies have been applied in China, Spain, and Italy ???



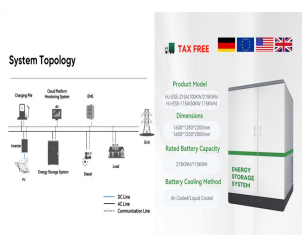
Nevertheless, the actual provided energy by the third line is 448.5 kWh when a total of 4 OBESDs are equipped on the train, which saves 12% energy consumption in comparison ???

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Among the various on-board or wayside measures proposed, one of the most promising solutions is based on using wayside energy storage systems (WESSs). A WESS is a storage installation which can be integrated into mass transit ???



Rapid transit trains can benefit substantially from aboard electric storage devices for the recuperation of the kinetic energy during braking and the limitation of power supplier ???



Super-capacitors have been suggested in several studies to be used as the energy storage device [14] but flow batteries can be used as a replacement for this purpose to ???



In order to compare the effectiveness of the storage devices, the reference case, characterized by the absence of storage device, has been simulated. In Fig.8 the total feeding substation current, the odd and even ???



Focusing on the energy-conservation train operation issues, this paper proposes an effective real-time train regulation scheme for metro systems with energy storage devices. ???

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This paper investigates the benefits of using the on-board energy storage devices (OESD) and wayside energy storage devices (WESD) in light rail transportation (metro and tram) systems. The analysed benefits are the use of OESD and ???