

Can hybrid locomotives save energy?

Backward-looking models of diesel-electric and hybrid locomotive are developed. Battery is properly sized according to the braking energy potential. Optimized energy management strategy has been proposed. Hybrid locomotive can achieve fuel cost savings up to 16.5%. Hybridization investment costs would be compensated three times.

Can diesel-electric and battery-electric locomotives be used for heavy-haul railway freight?

The paper has considered a novel approach to heavy-haul of railway freight by means of combined operation of conventional diesel-electric and battery-electric locomotives for different characteristic scenarios of single and joint (tandem) operation of conventional and battery-electric locomotives.

Can a battery-electric locomotive save energy?

In tandem operations, a battery-electric locomotive can facilitate notable fuel savings of up to 30% associated with diesel-electric locomotive use, in particular if a dual charging scenario is considered, which is also reflected in proportional greenhouse gasses emissions reductions.

How much fuel savings can be achieved by combining Diesel-electric and battery-electric locomotives?

Depending on configuration, between 19% and 30% of fuel savings may be achieved. The paper considers a novel approach to heavy-haul of railway freight by means of combined operation of conventional diesel-electric and battery-electric locomotives either in single or joint (tandem) operation.

How to control power flow in a battery-electric locomotive?

In order to facilitate power flow control from the battery-electric locomotive and to avoid deep battery discharges a suitable control rule is introduced aimed at modulating the driver power (throttle Notch) command in order to maintain the battery state-of-charge above the safe lower limit during discharging.

What is the maximum load a locomotive can carry?

This roughly corresponds to the maximum load for a single locomotive traveling over that route, which is typically limited below 600t.

During $t \in (0, 0.1)$ s, the value of the RBE is 4 MV, the ESS is idle, and all the energy returns to the power grid through the TT; during $t \in (0.1, 0.2)$ s, the value of the RBE is ...

This animation shows how a Stat-X [®] condensed aerosol fire suppression system functions and suppresses a fire in an energy storage system (ESS) or battery energy storage systems ...

Toshiba's Traction Energy Storage System (TESS) with SCiB(TM) is a new energy saving solution with Toshiba's own battery technology of high quality. When a train set is braking, it generates energy which can

be used by ...

The diesel, flywheel, and battery locomotives have traction powers of 3100 kW, 2000 kW, and 3100 kW, respectively. Energy storages for the flywheel and battery ESSs are 500 kWh and 5000 kWh, respectively. ...

Effective thermal management of locomotive systems is crucial for ensuring the safe operation of trains through high geothermal tunnels. By taking advantage of the frequent ...

Energy storage systems act as virtual power plants by quickly adding/subtracting power so that the line frequency stays constant. FESS is a promising technology in frequency ...

power that is supplied back to the rechargeable storage system. The rechargeable energy storage system must be made up of many batteries connected in series and parallel to take the load of ...

This article provides a detailed review of onboard railway systems with energy storage devices. In-service trains as well as relevant prototypes are presented, and their characteristics are ...

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