

Can high-speed rail save energy?

The research of Feng (2011) and Chiara et al. (2017) indicates that high-speed rail can realize the goal of energy saving and consumption reduction. HSR diverts traditional railroads' combined passenger and freight transportation, consistent with Lin et al. (2021) research.

Are high-speed trains energy efficient?

The energy efficiency of high-speed train moving between two successive stations is first studied, then we broaden our research vision in space and time until the global energy efficiency emergence of all in-service high-speed trains in the whole life cycle of railway transportation system can be understood.

What needs to be improved in energy-saving train operation?

In the current study, what needs to be improved are as follows: 1. The energy consumption, rather than energy efficiency, was usually used to evaluate the effect of energy-saving train operation, which may be difficult to obtain the objective conclusions, especially in some cases such as the rapid increase or sharp decrease of transportation tasks.

What should China do about high-speed railway construction?

The government should thoroughly investigate the line planning stage, and give full play to the foresight and anticipation of the policy, to effectively enhance the "speeding up" effect of high-speed railway construction on energy efficiency and the development of China's green economy.

How does high-speed rail work?

On the one hand, high-speed rail's spatial and temporal compression can reduce transportation time and cost between cities and improve regional accessibility. It helps to break the regional restriction of factor flows and raise the allocation efficiency of resources, thus generating economic spillover effects (Chen & Haynes, 2017).

What is the energy consumption ratio of high-speed rail and automobile?

According to the statistics, the high-speed rail and automobile energy consumption ratio is 1:2.4 (Gin & s, 2012). The shifting effect of passenger flow contributes to a significant reduction in the energy consumption of road passenger transport in urban transportation systems and improves energy efficiency.

The regenerative braking energy of high-speed railway features high power and high energy. It is difficult to recover it only by using high power density supercapacitors or high energy density ...

The remainder is as follows: the relationship between high-speed rail and energy consumption will be analyzed in Section 2; the methodology, variables and data will be introduced in Section 3; the empirical results of the impact of high-speed rail on city's energy consumption will be reported in Section 4; the intermediary roles of industry and ...

A recent article published in Renewable and Sustainable Energy Reviews unpacks how energy storage can be strategically integrated into electric rail infrastructure to decrease emissions, cut costs, and boost energy efficiency.

There are many different ways to recover energy from trains. However, especially saving energy which gets from regenerative braking has two ways. One of them is reversible ...

This study examines how high-speed rail network impacts the energy consumption of hi-tech firms along the line. The results show that the opening of high-speed railway stations in a county leads to reduction in energy consumption by hi-tech firms in the county. This effect is stronger with increased density of railway lines in the region.

Therefore, this paper proposes an optimal configuration method for the access capacity of wind power generation system (WPGS), photovoltaic power system (PVPS), and ...

Nazir [25] recommended a grid-connected solar PV system with a storage unit to supply energy to high-speed railway tracks. Tariq [26] examined a comparative study between two different ...

Background: The energy consumption of a high-speed system is an important part of its total operational costs. This paper compares the secondary energy demand of different wheel-rail systems, such ...

High-speed rail transportation utilizes 80-90% less energy and produces 3-4 times less pollution than air travel [30]. The goal of achieving net-zero global CO₂ emissions by 2050 must now be maintained by ensuring that the 2021 global emissions recovery was an anomaly and that sustainable investments paired with increased clean energy ...

High-Speed Rail Network Design and Station Location Model and Sensitivity Analysis Alexander Lovett, Greg Munden, M. Rapik Saat, and Christopher P. L. Barkan To improve the personal mobility, safety, and environmental impact of passenger travel and to strengthen regional and national economies,

Benefiting from large-scale infrastructure investment, China's high-speed rail (HSR) developed rapidly. As of 2019, the total operating mileage of China's high-speed rail exceeded 35,000 km, which was more than two-thirds of the world's total high-speed rail mileage, and the number of prefecture-level cities covered exceeds 200.

Train light-weighting has a positive effect on its own energy-saving operation because it can make a train lighter than before so that its kinematic performances can be improved for energy consumption reduction. The aerodynamic design of high-speed train is also becoming dominant in the development of high-speed railway lines [3].

High Speed Rail and Sustainability 3 High Speed Rail - at a glance There is no single standard definition of HSR (nor even a standard usage of the term: sometimes it is called "high speed" and sometimes "very high speed"). The definitions vary according to the criteria used since HSR corresponds to a complex reality.

The total operational length of China's high-speed railway network has exceeded 45,000 kilometers, with Fuxing high-speed trains operating across 31 provincial-level regions nationwide. This growing volume of railway transportation is supported by innovations and high-quality development concerning China's rail transit equipment.

Rail statistics on energy consumption and emissions Meeting UNECE - WP6 - April 24-26, 2024 ... Load factor of passenger transport services (total, local/regional, intercity, high speed) Net tonne-kilometres for freight transport services Data should be consistent with the corresponding energy consumption data provided

Most currently deployed onboard ESS are used in light-rails, though the N700S Shinkansen train in Japan is the world's first high-speed train with a self-propelling battery. Wayside ESS are instead positioned alongside ...

These systems can provide high power outputs for short durations, making them ideal for scenarios involving quick bursts of energy demand. By integrating a diverse array of ...

It is essential to explore the effect of high-speed rail on energy efficiency to develop medium and long-term green development plans and realize the "dual-carbon target" in China. ...

Energy consumption in rail). A survey was conducted with European rail infrastructure managers and operators and then compared to published literature. The survey revealed that a large proportion of the energy used today in European railway operations is for traction energy (the movement of trains). A total of 86.7% of energy

The energy use and environmental emissions associated with a high-speed train consist of embodied and operational components. One high-speed train fleet in China usually includes multiple units, which are propelled by electricity. In this study, we adopted a mainstream high-speed train fleet in China, the C380B, as a case study.

A power management system for high-speed rail locomotives with FESS is represented [182]. The reuse of regenerative energy from vehicle braking is the important benefit of using energy storage in electrical railways. Furthermore it can increase electrical railway energy efficiency. ... To store energy in rural Africa the design, ...

The global railway sector is working extremely hard to maintain its environmental advantage by improving its energy efficiency and reducing its CO₂ emissions. For example, 28 European UIC members have collectively

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With a price tag of just EUR17.7 million per kilometre, Spain's construction expenses for high-speed rail remain well below the EUR45.5 million incurred by other high-speed rail nations. This achievement underscores ...

A "masterplan" for a high-speed rail network connecting all EU capitals. The report proposes a "masterplan" for a high-speed rail network connecting all EU capitals and major cities and calls on the European ...

On the other hand, the mean power W_{mean} that can be regenerated depends on the kinetic energy of the train $m \cdot v_{max}^2$ and on the braking occurrence f_b (i.e. defined as the number of braking events with respect to traveling time). On tramways and light urban railways, the vehicles traveling speed and equivalent inertia are much smaller with respect to high ...

The next country to make high-speed rail available to the public was France in 1981, with service at 200 km/h (124 mph) between Paris and Lyon. Today, the French high-speed rail network comprises over 2,800 km of Lignes ...

High-Speed Rail. High-speed rail networks are increasingly adopting electrification due to the efficiency and environmental benefits. Electric trains can accelerate and decelerate more rapidly than their diesel ...

Discover the different types of train power sources, including diesel engines, electric motors, and steam engines. ... These trains store energy in the batteries during periods of low demand or regenerative braking and use it to propel the train when needed. Battery electric trains offer several benefits, including zero emissions, quiet ...

Energy-efficient optimization of train speed profiles can effectively reduce the traction energy consumption of urban rail transit systems. Existing reinforcement learning (RL) ...

As the world moves toward greener energy, high-speed rail has the potential to become one of the most sustainable modes of transportation. 7. Safety Features: Protecting Passengers. The safety of passengers is a priority ...

Wireless sensing in high-speed railway turnouts with battery-free materials and devices ... Delphi approach. 49, 50 A hybrid wind energy harvesting system based on self-adapting drag-lift conversion was created to power high-speed railway turnout monitoring from the standpoint of the self-powered monitoring system for the operational ...

Electrical energy can be obtained from vibration using piezoelectric (PE), electromagnetic (EM), triboelectric (TE) or electrostatic (ES) transduction mechanisms. PE and EM have been widely investigated and understood, whereas TE and ES are still in their ...

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