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Riding the rails to DC power efficiency: energy efficiency in dc-electrified metropolitan railways

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Abstract— Energy and environmental sustainability in transportation have become crucial in recent decades. According to the Intergovernmental Panel on Climate Change's Fifth Assessment Report (AR5), the transport sector accounted for 27% of the final energy use and 6.7 gigatons of CO2 direct emissions in 2010, with baseline CO2 emissions projected to approximately double by 2050. Reductions in total transport CO2 emissions of 15-40% compared to baseline growth could be achieved in 2050. In this context, railway systems are growing steadily more important in developed countries. Their high energy efficiency makes them preferable to other transportation methods, both for passengers and freight. In the case of passengers, they are able to move a large number of people without local emissions, thus reducing pollution. Electrified railway lines also contribute to the use of renewable energy sources.

Index Terms— air pollution control; carbon compounds; energy conservation; railway electrification

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