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Montevideo’s railway passenger service: improved energy and transport evaluation.

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Extended Abstract

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Abstract Summary

Uruguay has risen as a global leader in the energy transition, achieving nearly 99% renewable electricity generation. However, the transport sector, accounting for 25% of final energy consumption, remains heavily dependent on fossil fuels and represents a key challenge for decarbonization. At the same time, major congestion affects access corridors to Montevideo. This study investigates how the implementation of a passenger rail service along the Ferrocarril Central railway line can be optimized to support both urban mobility and decarbonization objectives.

The analysis combines energy system assessment and transport appraisal methods to compare diesel, battery-electric, and hydrogen traction options. Performance is evaluated at both railway and territorial scales, considering energy efficiency, emissions, and socio-economic impacts. The study uses data from Uruguayan public institutions.

Results provide a comparative ranking of the three energy carriers and show how integrating territorial energy interactions can modify conventional evaluation outcomes. The study highlights that combining energy and transport evaluation frameworks leads to more robust decision-making for railway planning and decarbonization strategies.

Presenting Author Biography

Julia Godoy is a first-year PhD candidate at CentraleSupélec and a railway study engineer at Setec Ferroviaire, where she specializes in eco-design methodologies, energy assessment, and railway operations. Through her role at Setec Ferroviaire, she has contributed to high-speed rail projects in France and regional rail studies in Montevideo, Uruguay. She holds a Master's degree in Economics, Environment, Energy and Transport (EEET) from Université Paris-Saclay and an industrial engineering degree from the Universitat Politècnica de Catalunya (UPC), Barcelona. Her research sits at the intersection of transport economics and energy transition.