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Energy Demand and Decarbonisation Pathways for Global Passenger Transport to 2050

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Extended Abstract

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Abstract Summary

Global passenger transport energy consumption has rebounded since the COVID 19 crisis and returned to its 2018 level by 2023. Despite this recovery, transport remains a major source of greenhouse gas emissions, accounting for about 22% of global CO_2 emissions in 2024, with passenger transport responsible for nearly half. The sector's heavy reliance on fossil fuels - over 90% of energy use - makes decarbonisation particularly challenging.

This paper develops a global decarbonisation scenario for passenger transport to 2050 using a model developed by EDF R&D. The scenario combines four main levers: changes in travel behaviour and mobility demand, modal shift toward less energy intensive modes, improvements in vehicle energy efficiency, and substitution of fossil fuels with low carbon energy sources. The contribution of each factor is analysed using the LMDI decomposition method.

Results indicate that oil consumption and CO_2 emissions from passenger transport could be reduced by around 50% by 2050, mainly due to efficiency gains, electrification, and modal shift. However, deeper reductions will require additional efforts to limit the growth of passenger transport demand.

Presenting Author Biography

François Cattier is a Project Manager at EDF R&D, responsible for issues related to the evolution of the international energy system. Before joining EDF, François Cattier was a Senior Energy Analyst at the International Energy Agency, where he co-authored six editions of the World Energy Outlook. François Cattier began his career at CNRS, contributing to the development of the global energy model POLES.