

# **Economies of scale matter: how refuelling infrastructure policy affects the viability of alternative fuel trucks**

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## **Abstract-**

**This study examines the role played by economies of scale in the economic viability of alternative fuel trucks; such as battery-electric (BET) and fuel cell electric trucks (FCET). Focusing on the role of infrastructure deployment, the research develops a fleet-wide Total Cost of Ownership (TCO) model covering the period 2025–2040 and accounting for multiple truck segments and mission profiles. The model explicitly integrates refuelling and charging infrastructure costs by linking the levelised cost of hydrogen supply (LCOSH) to station capacity and utilisation, and by modelling depot–public charging mixes for BETs. By incorporating stochastic projections of component costs, energy prices, and utilisation levels, the analysis captures uncertainty and scale effects consistent with AFIR infrastructure targets.**

**The findings show that, on average, BETs are likely to dominate in the short and medium term, particularly in urban and regional logistics. FCETs can also become competitive in long-haul operations. However, the competitiveness of both alternatives depends to a large extent on the economies of scale of recharging infrastructures, with FCETs requiring large fleets or shared stations in order to reduce refuelling costs.**

**The paper discusses the implications of these findings for European green infrastructure policies, in particular AFIR, which must be aligned with these economic realities in order to be successful.**

**Index Terms-** Decarbonisation of transport; Heavy-duty; Alternative fuel trucks; Total cost of ownership (TCO); Infrastructure policy

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