

Motivation | Problem Statement

Research Question

Scientific publication

- What are required fast-charging capacities along Austria's highway network for long-distance travel with BEV passenger cars and where are these located under different decarbonization scenarios?
- Future charging infrastructure demand affected by different decarbonization scenarios for the transport sector (electrification share, technological improvements, shift to other travel modes, ...)

RQ1

What are required fast-charging capacities along Austria's highway network for battery-electric passenger cars under different decarbonization scenarios and where are these located ?

Golab, A., Zwickl-Bernhard, S., & Auer, H. (2022). Minimum-Cost Fast-Charging Infrastructure Planning for Electric Vehicles along the Austrian High-Level Road Network. *Energies*, 15(6), 2147. <https://doi.org/10.3390/en15062147>

- Battery-electric vehicles are currently luxury item that are used in higher-income level classes
- Unexplored impact of different public charging infrastructure roll-out strategies in two dimensions: on BEV adoption in different income levels and on neighbouring regions (spillover effect)

RQ2

To what extent do the speed and spatial distribution of public infrastructure expansion influence BEV adoption rates among various income groups and across neighboring regions?

Golab, A., Zwickl-Bernhard, S., & Auer, H. (2025). Public charger expansion: Impacts across income classes and beyond regional borders [Manuscript submitted for publication]. *Transportation Research Part D: Transport and Environment*.

passenger car fleets

commercial fleets

- Cost differences in the installation of charging infrastructure and charging by country and electricity market zone indicate potential for "charging tourism"
- Unknown magnitudes of potential charging infrastructure capacity allocations being affected by these differences

RQ3

What magnitude of charging infrastructure capacities is affected by geographically varying network fees and electricity prices in the cost-optimal planning of charging infrastructure allocation for long-haul battery-electric trucks?

Golab, A., Bakker, S., Zwickl-Bernhard, S., & Auer, H. (2025). Spatial flexible charging load allocation for inter-zonal long-haul truck electrification [Manuscript submitted for publication]. *Energy Reports*.

- Future impact of charging demand of battery-electric commercial fleet and potential for demand-side flexibility
- Quantification of large-scale charging demand of battery-electric fleet at hourly temporal and NUTS-2 level under the consideration of transport flows within the countries and transit traffic in Austria

RQ4

What is the expected charging demand of the commercial BEV fleet spatio-temporally distributed in Austria in 2040?

Golab, A., Loschan, C., Zwickl-Bernhard, S., & Auer, H. (2025). The value of flexibility of commercial electric vehicle fleets in the redispatch of congested transmission grids. *Energy*, 316, Article 134385. <https://doi.org/10.1016/j.energy.2025.134385>